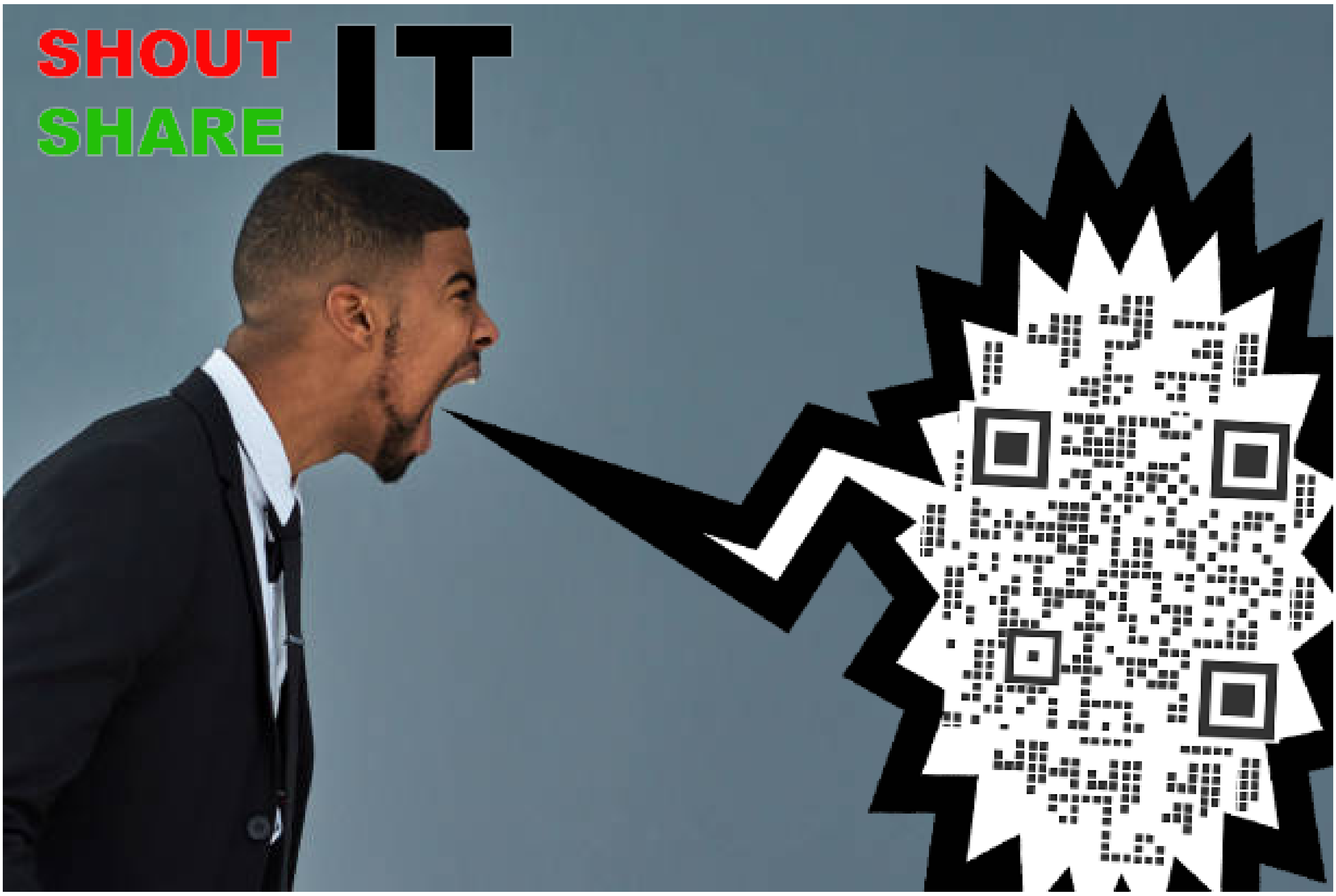
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FLORA OF COSTA RICA

BY

PAUL C. STANDLEY

CURATOR OF THE HERBARIUM, DEPARTMENT OF BOTANY

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FLORA OF COSTA RICA

Paul C. Standley

GESNERIACEAE[1]

By C. V. Morton

Herbs or shrubs, often epiphytic; stems often unbranched, fleshy, usually pubescent; leaves opposite or rarely alternate, those of a pair often unequal, petiolate, the blades usually membranous, entire or toothed, pinnately veined; flowers hermaphrodite, axillary or rarely terminal, solitary, fasciculate, umbellate, or racemose, often bracteate; calyx lobes often colored, free or connate, 5, usually valvate, often unequal, sometimes toothed or incised; corolla variously colored, gamopetalous, often spurred at base, the tube cylindric, ventricose or upwardly ampliate, often hairy, the limb usually bilabiate, the lobes rounded, sometimes toothed or fimbriate; stamens 4, didynamous, a rudimentary fifth sometimes present, the filaments adnate to the corolla at the base, often connate, often contorted, the anthers quadrate to oblong, often connate, the cells discrete or confluent, longitudinally dehiscent; ovary superior or partly or wholly inferior, 1-celled, the 2 parietal placentae 2-lobed, the ovules anatropous, very numerous, borne on the inner surface of the lobes or on both the inner and outer surfaces; style simple, elongate; stigma bilobed or stomatomorphic; disk hypogynous or perigynous, annular or of distinct glands; fruit capsular or baccate, the pericarp usually coriaceous; seeds minute, very numerous, usually fusiform, spirally striate.

Very little work has been done on this family in the last seventy years. The genera are here adopted in the conventional sense, as delimited by Hanstein, but it seems likely that monographic studies will show the necessity for a realignment of the genera, particularly in the tribe Columneoideae. The large genera *Columnea*, *Alloplectus*, and *Drymonia* are almost indefinable as at present constituted. A few additional genera are found in Central America.

[The Gesneriaceae constitute one of the most characteristic and in many respects most interesting groups of Costa Rican plants, and include also many of the most beautiful and showy ones. While they are found at all elevations and in almost every locality, they attain most profuse development at upper elevations, chiefly in the more humid forests. While many of the plants are terrestrial, the majority, at least as regards number of individuals, are epiphytic in habit.

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Especially beautiful are the Columneas, whose usually large and brilliant red blossoms furnish a large part of the bright color seen on the upper mountain slopes, where they often are associated with Ericaceae and other conspicuous epiphytes. Very handsome, too, are some of the epiphytic species of *Drymonia* and *Alloplectus.* Most curious in their flowers are the Campaneas, whose oddly colored blossoms dangle from the branches on cordlike peduncles. Most gorgeous of terrestrial Gesneriaceae is *Solenophora calycosa,* whose red-orange corollas are as large as teacups.—Paul C. Standley.]

Ovary superior.

Leaves alternate; inflorescence a terminal, lax raceme; corolla blue. *Klugia.*

Leaves opposite or radical; inflorescence axillary, the flowers solitary, fasciculate, or umbellate, rarely short-racemose; corolla not blue.

Calyx lobes connate over two thirds their length...... *Tussacia.*

Calyx lobes free or nearly so.

Plant acaulescent; sepals strongly parallel-nerved. *Napeanthus.*

Plants caulescent; sepals not parallel-nerved.

Anther cells separated by the enlarged connective. Creeping, herbaceous vine with glabrous, fleshy leaves. *Codonanthe.*

Anther cells contiguous or confluent.

Anther cells confluent at the apex; disk annular or rarely semiannular.............................. *Besleria.*

Anther cells discrete; disk of distinct glands or reduced to a solitary, posterior gland.

Plants low, terrestrial, stoloniferous herbs; placentae ovuliferous on both surfaces. Corolla lilac, not contracted in the throat, the limb widely spreading; calyx lobes spatulate.................... *Episcia.*

Plants shrubs or rarely herbs, not stoloniferous; placentae ovuliferous on the inner surface only.

Corolla erect in the calyx, not spurred at the base, sometimes a little gibbous, not contracted in the throat; limb often strongly bilabiate, or if not, the leaves of a pair usually unequal, the smaller stipule-like................*Columnea.*

Corolla oblique or horizontal in the calyx (except in *Alloplectus multiflorus*), spurred at the base; limb regular or slightly bilabiate; leaves of a pair not strongly unequal (except in *Alloplectus metamorphophyllus*).

Anthers oblong, sagittate at the base, only partially dehiscent.

Corolla ampliate in the throat, usually much exceeding the calyx, the limb broad; flowers often solitary, ebracteate. *Drymonia.*

Corolla usually contracted in the throat, often not much longer than the calyx, the limb narrow; flowers often fasciculate, bracteate. *Alloplectus.*

Anthers ovate or quadrate, dehiscent throughout.

Flowers solitary; corolla tube strongly ventricose, the limb minute (3 mm. wide), oblique. Delicate, herbaceous vine...... *Hypocyrta.*

Flowers usually fasciculate or umbellate; corolla tube less strongly ventricose, the limb terminal, broader.

Calyx lobes linear; anthers ovate. *Centrosolenia.*

Calyx lobes broad; anthers quadrate or broader than long...........*Alloplectus.*

Ovary wholly or partly inferior.

Leaves alternate.................................*Gesneria.*

Leaves opposite.

Corolla rotate. Disk none........................*Phinaea.*

Corolla tubular or campanulate.

Disk none; calyx tube cylindric in fruit. Inflorescence terminal, open-paniculate....................*Monopyle.*

Disk present; calyx tube turbinate or hemispheric in fruit.

Disk annular.

Inflorescence terminal, racemose, the pedicels and bracts alternate............................ *Koellikeria.*

Inflorescence axillary or terminal, the pedicels and bracts (if present) opposite.

Corolla open-campanulate.................*Gloxinia.*

Corolla tubular.

Anthers connate, at least when young...*Achimenes.*

Anthers free..........................*Heppiella.*

Disk of 1 to 5 distinct glands or the 2 posterior ones partially connate.

Disk glands 2, posterior, connate, pubescent; calyx tube extended long beyond the ovary. Corolla scarlet, 7–9 cm. long.......................*Solenophora.*

Disk glands 5, glabrous; calyx tube not extended beyond the ovary.

Corolla scarlet, tubular...................*Kohleria.*

Corolla yellowish green, open-campanulate.*Campanea.*

ACHIMENES P. Br.

Perennial, terrestrial herbs, increasing by scaly offsets, the stems unbranched; leaves opposite, subequal or very unequal, the blades toothed, membranous; inflorescence axillary, the flowers solitary or several on a common peduncle; calyx tube turbinate, the lobes free, elongate, entire; corolla salverform, the tube not ventricose, the limb actinomorphic or subbilabiate; filaments inserted near the base of the corolla tube; anthers oblong or quadrate, the cells not confluent at the apex; ovary entirely inferior; disk annular, entire, glabrous.—Two or three additional species occur in Central America.

Stigma stomatomorphic; lamellae of the placentae ovuliferous on the inner surface only; disk high, interrupted dorsally; corolla white, spotted with red; stems glabrous.................*A. candida.*

Stigma bilobed; lamellae of the placentae ovuliferous on both surfaces; disk low, entire; corolla red or purple; stems pilosulous or pilose.

Flowers erect in the calyx, not spurred at the base; leaf blades cuneate at the base, the veins 3–5 pairs.

Corolla purple, 5.5–6.5 cm. long; calyx lobes 11–14 mm. long, ciliate, otherwise glabrous.................*A. longiflora.*

Corolla red, 1.5–2 cm. long; calyx lobes 4.5 mm. long, pilosulous, not ciliate.................................*A. pulchella.*

Flowers oblique or horizontal in the calyx, short-spurred at base; leaf blades rounded or subcordate at base, the veins 8–12 pairs.
  Corolla scarlet, spotted, stipitate-glandular in the throat; peduncles often 2–3-flowered .... *A. pedunculata.*
  Corolla purple, not spotted, glabrous within the throat; peduncles 1-flowered .... *A. grandiflora.*

Achimenes candida Lindl. El General. Guatemala. An herb 45–50 cm. high, the stems glabrate; leaves opposite, usually very unequal, the short petioles pilosulous on the upper side only, the blades elliptic, up to 8 cm. long and 3.3 cm. wide, acuminate, cuneate at the base, serrate (the teeth 10–15 on each side), sparsely scabrous-puberulous beneath; common peduncle 4–7 mm. long, 2–3-flowered, the pedicels slender (less than 0.5 mm. in diameter); calyx about 5.5 mm. long, the tube 2.5 mm. long, articulate-pilose, the lobes puberulous on both sides; corolla white, spotted in the throat, 15–17 mm. long, erect in the calyx, not spurred, nearly glabrous, the limb 12–13 mm. wide; filaments glabrous.

Achimenes grandiflora (Schiede) DC. Central mountains, 1,200–1,600 meters; region of San Ramón. Northward to Veracruz. An herb 30–60 cm. high; leaves opposite, long-petiolate, the blades ovate, up to 15 cm. long and 8 cm. wide, acuminate, oblique and subcordate at the base, coarsely serrate (the teeth 15–25 on each side), scabrous-puberulous beneath; common peduncle absent, the pedicels solitary, 5–7.5 cm. long, bulbilliferous; calyx 8–10 mm. long, the tube 4 mm. long, hirtous-puberulous, the lobes scabrous-puberulous on both sides, not ciliate; corolla purple, not spotted, horizontal in the calyx, 3.5–4.5 cm. long, spurred at the base, the tube pilosulous, the limb slightly or strongly bilabiate, 2.5–3 cm. wide; filaments glabrous.

Achimenes longiflora DC. Centralamer. Gesner. 17. *pl. 9, f. 1, 2.* 1858 (Cerro de Aguacate, *Oersted*). *A. pauciflora* Oerst. Atlantic coast; central mountains; region of San Ramón. Mexico to Panama. Herb, 10–30 cm. high; leaves opposite or ternate, short-petiolate (6 mm.), the blades ovate to lanceolate, 2–8.5 cm. long, 1.3–3 cm. wide, acute, cuneate at the base, serrate (the teeth few), appressed-pubescent; common peduncle absent, the pedicel solitary, 4–7 mm. long; calyx 13–17 mm. long, the tube 2–3 mm. long, densely pilose, the lobes linear-lanceolate, nearly glabrous, long-ciliate; corolla purple, 5.5–6.5 cm. long, erect in the calyx, not spurred, the tube very slender, glabrous, the limb broad (4–5 cm.), subactinomorphic; filaments glabrous. Several minor named forms occur in Costa Rica.

Achimenes pedunculata Benth. Central mountains, at 1,000–1,200 meters; region of San Ramón. Guatemala. An herb 40–85 cm. high, the stems short-puberulous upwardly; leaves opposite, long-petiolate, the blades broadly elliptic, up to 15 cm. long and 8 cm. wide, cuspidate-acuminate, oblique and rounded at the base, coarsely toothed (the teeth 30 or more on each side), minutely puberulous beneath; common peduncle obsolete or up to 7 cm. long, bibracteate at the apex, 1–3-flowered, the pedicels elongate, bulbilliferous at middle; calyx 6.5 mm. long, the tube 3 mm. long, scabrous-puberulous, the lobes not ciliate, scabrous-puberulous; corolla scarlet, red-spotted in the throat, 30 mm. long, short-spurred, not ventricose, short-puberulous, the limb regular, stipitate-glandular in the throat; filaments pilosulous.

Achimenes pulchella (L'Hér.) Hitchc. *A. coccinea* Pers. Reported from Costa Rica by Hemsley. Widely distributed in Mexico, Central America, and the West Indies. An herb 10–30 cm. high; leaves opposite or ternate, short-petiolate, the blades ovate to elliptic, up to 5 cm. long and 1.6 cm. wide, acute or obtusish, acute at the base, coarsely dentate (the teeth 3 to 5 on each side), pilosulous; common peduncle none, the pedicel solitary, up to 2.5 cm. long, slender, ebracteate, not bulbilliferous; calyx about 6.5 mm. long, the tube 2 mm. long, densely pilosulous, the lobes pilosulous on both sides; corolla red or pink, not spotted, 15–20 mm. long, erect, not spurred, the tube puberulous, the limb 12–15 mm. wide; filaments glabrous.

ALLOPLECTUS Mart.

Shrubs or vines, usually epiphytic; leaves opposite, equal or rarely unequal, often rather long-petiolate, the blades entire or toothed; flowers fasciculate or rarely solitary or in short, axillary racemes, bracteate, the bracts often large and colored; calyx usually colored, the lobes free, broad, often toothed or incised; corolla yellow or red, erect or horizontal in the calyx, usually not much exceeding the calyx, the tube usually ventricose, pilose, contracted in the throat, the limb narrow, nearly regular, the lobes rounded, usually entire; filaments connate at the base, usually adnate to the corolla, the anthers commonly free, oblong to quadrate or broader than long, the cells distinct, sometimes sagittate at the base, sometimes only partially dehiscent; disk gland solitary, large; fruit baccate.—Several other species are found in Central America.

Leaves dimorphic, the smaller ones being stipule-like phyllodes.
A. metamorphophyllus.

Leaves not dimorphic, sometimes unequal.
  Corolla erect in the calyx, not spurred or saccate at the base; calyx lobes equal, erect, red, pectinate-toothed . *A. multiflorus.*
  Corolla oblique or horizontal in the calyx, spurred or saccate at the base; calyx oblique or the lobes unequal.
    Anthers quadrate or broader than long, not sagittate at the base.
      Calyx lobes entire, linear or linear-lanceolate . *A. congestiflorus.*
      Calyx lobes conspicuously toothed, ovate to lanceolate.
        Corolla contracted in the throat; anthers quadrate; pedicels about 1 cm. long .... *A. ichthyoderma.*
        Corolla enlarged in the throat; anthers broader than long; pedicels 3–5 cm. long .... *A. tetragonus.*
    Anthers oblong, sagittate at the base.
      Corolla and calyx glabrous .... *A. stenophyllus.*
      Corolla and calyx pubescent.
        Leaves peltate .... *A. peltatus.*
        Leaves not peltate.
          Calyx lobes entire; flowers short-racemose. *A. tucurriquensis.*
          Calyx lobes toothed; flowers fasciculate.
            Calyx lobes minutely dentate at the apex. *A. coriaceus.*
            Calyx lobes subulate-toothed.
              Corolla not contracted in the throat; calyx lobes ovate .... *A. macrophyllus.*
              Corolla contracted in the throat; calyx lobes lanceolate .... *A. parviflorus.*

Alloplectus congestiflorus (Donn. Smith) Morton, comb. nov. *Besleria congestiflora* Donn. Smith, Bot. Gaz. 61: 379. 1916. La Palma, Prov. San José, 1,460 meters, *Tonduz 12658.* Region of San Ramón. Endemic. An epiphytic shrub, 25–60 cm. high, the stems tomentose, sparingly branched; leaves equal, petiolate, the petiole up to 3 cm. long, the blade oblanceolate, up to 10.5 cm. long and 3.5 cm. broad, acuminate, attenuate at the base, serrulate, densely tomentose on both sides; flowers aggregate in the leaf axils, the pedicels 3–5 mm. long, the bracts linear-lanceolate; calyx lobes red, linear or linear-lanceolate, 7–10 mm. long, equal, acuminate, entire, pilose on both sides; corolla white, marked with rose on the limb, tubular, about 12 mm. long, pilose, the throat contracted, the limb spreading, narrow, subregular; anthers quadrate, persistently connate, the cells orbicular, not confluent; disk gland solitary.

Alloplectus coriaceus (Oerst.) Hanst. Linnaea 34: 363. 1865–66. *Erythranthus coriaceus* Oerst. Centralamer. Gesner. 47. *pl. 3.* 1858. *A. ventricosus* Donn. Smith, Bot. Gaz. 25: 154. 1898 (Atirro, Prov. Cartago, 600 meters, *J. D. Smith 6727*). Turrialba, *Oersted.* Atirro; Tucurrique; Guanacaste. Endemic. An epiphytic shrub up to 2.4 meters high, the stems unbranched, minutely strigillose; leaves subequal, short-petiolate (1–3 cm.), the blades oblanceolate, up to 25 cm. long and 8 cm. wide, short-acuminate, attenuate at the base, subcoriaceous, entire, glabrous, reddish; inflorescence congested, the bracts red, numerous, persistent, orbicular-oval, about 1.5 cm. long, sparsely strigillose; calyx oblique, red, the lobes unequal, obovate-oval, about 1 cm. long, dentate at the apex, red-strigillose; corolla red, gibbous at the base, oblique in the calyx, 1.6–2.8 cm. long, reddish-tomentose, the tube strongly ventricose upwardly, contracted in the throat, the limb oblique, about 3 mm. wide, subregular, the lobes minute, erect; anthers oblong, 3 mm. long.

Columnea costaricensis Kuntze, Rev. Gen. 2: 471. 1891 (Port Limón, *Kuntze*). Species dubious, doubtless belonging to *Alloplectus.*

Alloplectus ichthyoderma Hanst. Linnaea 34: 372. 1865–66. *A. ruacophilus* Donn. Smith, Bot. Gaz. 54: 238. 1912 (forests of Volcán de Barba, Prov. Heredia, 2,500–2,700 meters, *Tonduz 1997*). Costa Rica, without locality, *Wendland 833.* Central mountains, 1,800–2,700 meters. Panama. A terrestrial shrub, 0.6–1.5 meters high, the stems unbranched, hirsute, the epidermis peeling off in scales; leaves subequal, long-petiolate, 2.5–8.5 cm. long, the blades elliptic, up to 20 cm. long and 9 cm. wide, cuspidate-acuminate, cuneate at the base, denticulate, membranous, green and pilose above, pale and minutely strigillose beneath; flowers fasciculate, numerous, the bracts ovate, red, entire, about 1 cm. long, the pedicels 1.5–2 cm. long, appressed-pilose; calyx oblique, the lobes red, or green with red margins, ovate to lanceolate, up to 1.8 cm. long, obtuse to acuminate, subequal, serrate, white-pilose, especially near the midrib and base; corolla yellow, tubular, 15–23 mm. long, gibbous at the base, horizontal in the calyx, the tube white-tomentose externally, strongly ventricose upwardly, contracted in the throat, the limb oblique, about 8 mm. wide, subregular, the lobes subequal, erect, 2–3 mm. long; filaments glabrous; anthers quadrate, connate; ovary tomentose; style glabrous; stigma stomatomorphic.

Alloplectus ichthyoderma var. **hirsutulus** Morton, var. nov.—A var. *typica* foliis subtus hirsutulis nec strigillosis differt.—Atirro, Prov. Cartago, alt. 600 meters, *Donnell Smith 6715* (type in U. S. Nat. Herb., No. 1,336,496).

Alloplectus ichthyoderma var. **pallidus** Morton, var. nov.—A var. *typica* calycibus flavis vel pallide viridibus nec rubris differt.—Las Nubes, Prov. San José, 1,500–1,900 meters, *Standley 38793* (type in U. S. Nat. Herb., No. 1,228,403). Same locality, *Standley 38363, 38372.* Cerro Gallito, *M. Valerio 1004.*

Alloplectus ichthyoderma forma **rubescens** Morton, f. nov.—A f. *typica* foliis subtus rubescentibus nec pallide viridibus differt.—Santa Clara de Cartago, 1,950 meters, *Maxon & Harvey 8195* (type in U. S. Nat. Herb., No. 1,181,839).

Alloplectus macrophyllus (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 484. 1882. *Caloplectus macrophyllus* Oerst. Centralamer. Gesner. 45. 1858. Naranjo, *Oersted.* Llanuras de Santa Clara, *Donn. Smith 6725, 6733; Pittier 13393.* Tsaki, *Tonduz 9557.* Guatemala. A shrub 1.8 meters high, the stems subtomentose at the apex; leaves subequal, petiolate, the petioles subtomentose, 0.5–6 cm. long, the blades elliptic, up to 33 cm. long and 14 cm. wide, short-acuminate, rounded and oblique at the base, obscurely serrulate or entire, sparsely strigose above, minutely puberulous beneath; flowers fasciculate, few, the pedicels up to 1 cm. long, the bracts subulate, shorter than the pedicels; calyx lobes red or green, ovate, up to 15 mm. long, thin-membranous, densely strigillose, conspicuously subulate-toothed; corolla pale yellow with maroon stripes along the lower side, about 3 cm. long, spurred at the base posteriorly, horizontal in the calyx, densely but minutely puberulous, the tube regularly ampliate upwardly, not contracted in the throat, the limb slightly bilabiate, about 2 cm. wide; anthers oblong, sagittate.

Alloplectus metamorphophyllus Donn. Smith, Bot. Gaz. 52: 52. 1911. La Palma, Prov. San José, 1,500–1,600 meters, *Tonduz 10884.* La Hondura; Tucurrique. Endemic. An epiphytic, climbing shrub with unbranched, subtomentose stems; leaves strongly dimorphic, the larger long-petiolate (up to 13 cm.

long), the blade broadly elliptic, up to 20 cm. long and 11 cm. wide, short-acuminate, cuneate at the base, sharply serrulate, sericeous-pilose on both sides; smaller leaves stipuliform, linear-lanceolate, about 2–4 cm. long, sessile, entire; inflorescence of congested, many-flowered, axillary corymbs, the pedicels very short; calyx lobes erect, red, oblanceolate, 11–16 mm. long, pilosulous, deeply pectinate-incised; corolla erect in the calyx, shorter than the calyx, not gibbous at the base, sparsely strigillose, the tube a little ampliate upwardly, contracted in the throat, the limb narrow, regular; anthers connate, oblong, the cells distinct; disk gland solitary.

Alloplectus multiflorus (Oerst.) Hanst. Linnaea 34: 361. 1865–66. *Calanthus multiflorus* Oerst. Centralamer. Gesner. 47. *pl. 4.* 1858. Naranjo, *Oersted.* Central mountains, 1,300–1,700 meters; Atlantic coast. Endemic. A vine, the stems branched, minutely strigillose; leaves subequal, short-petiolate (2–3 mm.), the blades elliptic-lanceolate, up to 8 cm. long and 3 cm. wide, acuminate, cuneate at the base, entire, membranous, glabrous above, strigillose beneath; flowers solitary, axillary, the pedicels 1–1.5 cm. long, glabrate; calyx lobes red, equal, not oblique, ovate, up to 15 mm. long, deeply subulate-toothed, sparingly strigose; corolla yellow with red stripes, dark purple within, tubular, about 2.5 cm. long, erect in the calyx, the tube slender, strongly ventricose, glabrous, contracted in the throat, the throat sparsely pilosulous, the limb subbilabiate; anthers narrowly oblong.

Alloplectus parviflorus (Hanst.) Hemsl. Biol. Centr. Amer. Bot. 2: 484. 1882. *Polythysania parviflora* Hanst. ex Oerst. Centralamer. Gesner. 50. 1858. Naranjo, 1,200–1,500 meters, *Oersted.* Known definitely only from the type. Stems villous at the apex; leaves unequal, very short-petiolate, the blades obovate, the larger 7.5–10 cm. long, the smaller one-half shorter, acuminate, attenuate at the base, serrate, pubescent; flowers solitary, short-pedicellate, the pedicels hirsute; calyx lobes lanceolate, unequal, pubescent, laciniate-toothed; corolla saccate at the base, horizontal in the calyx, the tube inflated above, contracted in the throat, the lobes short; anthers oblong, sagittate. Description adapted from the original.

Alloplectus peltatus Oliver, Bot. Mag. 103: *pl. 6333.* 1877. Known only from material collected by Endres and cultivated at Kew. A shrub, the stems glabrous; leaves strongly unequal, the larger petiolate (2.5–5 cm.), the blade peltate, oval-oblong, 15–22.5 cm. long, 4.2–6.2 cm. wide, subcoriaceous, at first ciliolate, soon glabrous; flowers fasciculate, few, the pedicels 1.2–1.7 cm. long, the bracts lanceolate or ovate-lanceolate, acute, shorter than the pedicels; calyx oblique, red-purple, the lobes lanceolate, 2.5 cm. long, unequal, the posterior shorter; corolla pale yellow, the limb slightly bilabiate, the lobes fimbriate; stamens included, the filaments glabrous, the anthers sagittate, oblong. The above description is adapted from the original.

Alloplectus stenophyllus Donn. Smith, Bot. Gaz. 25: 153. 1898. Forests of Suerre, Llanuras de Santa Clara, 300 meters, *J. D. Smith 6724.* Atlantic coast at low elevations; region of San Ramón. Endemic. A small shrub, the stems glabrous; leaves unequal, often strongly so, petiolate (1–1.5 cm.), the larger blades narrowly elliptic to linear, up to 25 cm. long and 4.5 cm. wide, acuminate, obtuse at the base, subcoriaceous, often shining, entire, glabrous; flowers solitary or paired, the pedicels about 5 mm. long, glabrous, the bracts minute, subulate; calyx oblique, the lobes lanceolate, unequal, the longer about 16 mm. long, the posterior reflexed, about 10 mm. long, all entire, glabrous; corolla white or pale yellow, rosy in the throat, about 2.5 cm. long, spurred at the base, horizontal in the calyx, glabrous, the tube ventricose, contracted in the throat, the limb subbilabiate, about 1 cm. wide; anthers oblong, sagittate at the base; ovary glabrous.

Alloplectus tetragonus (Oerst.) Hanst. Linnaea 34: 368. 1865–66. *Glossoloma tetragonum* Oerst. Centralamer. Gesner. 41. *pl. 7.* 1858. Turrialba, 900 meters, *Oersted.* Central mountains, 1,400–2,000 meters. Endemic. A terrestrial or epiphytic shrub, 1–1.5 meters high, the stems unbranched, yellowish-subtomentose, the epidermis not peeling off in scales; leaves subequal, long-petiolate (3–9 cm.), the blades elliptic, up to 25 cm. long and 11 cm. wide, acuminate, cuneate at the base, serrate or serrulate, membranous, green and pilosulous above, pale and minutely strigillose beneath; flowers fasciculate, 2–several, the pedicels 3–5 cm. long; calyx oblique, the lobes red, or green with red margins, ovate, about 2 cm. long, subequal, subulate-toothed, hirsute; corolla red, tubular, 4–5 cm. long, gibbous at the base, oblique in the calyx, yellowish-hirsute, the tube ampliate upwardly, not contracted in the throat, the limb oblique, about 1 cm. wide, the lobes subequal; anthers broader than long.

Alloplectus tucurriquensis Donn. Smith, Bot. Gaz. 54: 238. 1912. Forests near Las Vueltas, Tucurrique, Prov. Cartago, 700 meters, *Tonduz 13042*. Known only from the type. An epiphytic shrub, the stems unbranched, puberulous at the apex; leaf blades broadly elliptic, up to 28 cm. long and 13 cm. wide, acuminate, attenuate at the base and long-decurrent into the short, stout petiole, serrulate, membranous, green, substrigose above, puberulous beneath; flowers in short, dense, axillary, bracteate racemes, the common peduncle 5–7 mm. long, the pedicels 13–18 mm. long, the bracts scarlet, 26–33 mm. long, entire; calyx green or reddish, slightly oblique, the lobes 20–28 mm. long, oblong, entire, minutely puberulous; corolla spurred at the base, about 3.5 cm. long, horizontal in the calyx, densely puberulous, ventricose upwardly, narrowed in the throat, the limb about 1 cm. wide, nearly regular; anthers narrowly oblong, 5 mm. long; ovary cinereous-strigillose.

BESLERIA [Plum.] L.

Shrubs with terete or quadrangular, usually unbranched stems; leaves opposite, equal, petiolate, usually elliptic, membranous to coriaceous; flowers ebracteate, commonly borne in sessile or pedunculate, axillary umbels, rarely solitary; calyx 5-parted nearly to the base, colored, the lobes imbricate; corolla erect or horizontal in the calyx, cylindric or spurred at the base, often pilose, the tube usually ventricose, usually contracted in the throat, the limb narrow or broad, regular or irregular, the lobes entire; filaments not connate, usually glabrous, the anthers quadrate, connate when young, the cells confluent at the apex; placentae ovuliferous on the inner surface only; disk annular or semiannular, glabrous or pubescent, sometimes much thickened posteriorly; fruit a fleshy berry.—Several other species occur in Central America.

Corolla not spurred at the base, erect or oblique in the calyx; disk glabrous, not thickened posteriorly.

 Common peduncle obsolete, the flowers aggregate in the leaf axils or solitary.

  Calyx lobes sharply toothed; corolla pubescent. Ovary pilose.

   Stems and leaves strigose; primary leaf veins 12 or 13 pairs; calyx lobes ovate........................*B. barbensis*.

   Stems and leaves hirsute; primary leaf veins 7–10 pairs; calyx lobes lanceolate, acuminate.

    Leaves tuberculate above, the tubercles surmounted by a long hair; corolla strongly bilabiate, much exceeding the calyx, pilose.......................*B. princeps*.

Leaves not tuberculate above; corolla nearly regular, scarcely longer than the calyx, copiously red-villous. *B. columneoides.*

Calyx lobes entire or sometimes a little erose at the apex; corolla glabrous or inconspicuously puberulous.

Stems and leaf veins beneath hirsute.

Calyx lobes linear-lanceolate, acuminate; corolla 11–13 mm. long, pilose; ovary pilose..............*B. trichostegia.*

Calyx lobes oblong to suborbicular, rounded; corolla 18 mm. long, glabrous; ovary glabrous.............*B. hirsuta.*

Stems and leaves tomentose, puberulous, strigillose, or glabrate.

Calyx lobes 10–12 mm. long; stems thick, densely tomentose.

Corolla and ovary glabrous...............*B. robusta.*

Calyx lobes 3–7 mm. long; stems appressed-pubescent or strigose.

Anther cells not confluent; corolla densely long-pilose. *B. pycnosuzygia.*

Anther cells confluent; corolla glabrous or sparsely pilosulous or puberulous.

Corolla tube 5–6 mm. wide, obviously gibbous at the base; calyx lobes suborbicular, broader than long, strongly imbricate; leaf blades obtuse or rounded at the base........................*B. Standleyi.*

Corolla tube not over 3 mm. wide, not gibbous at the base; calyx lobes oblong, scarcely imbricate; leaf blades cuneate at the base.

Stems thick (commonly 5–11 mm. in diameter); leaf blades subcoriaceous, 6–10 cm. wide. *B. notabilis.*

Stems slender (usually 2–3 mm. in diameter); leaf blades 5.5 cm. wide or less.

Corolla and ovary glabrous.........*B. solanoides.*

Corolla and ovary hairy. .*B. solanoides* var. *tenera.*

Common peduncle present, usually elongate, the pedicels umbellate or subcorymbose, rarely solitary (in *B. formosa*). Pubescence appressed.

Corolla with a hairy ring within at the insertion of the filaments; calyx lobes 7.5–14 mm. long, ovate to lanceolate, acute or acuminate. Corolla glabrous externally; ovary glabrous.

Leaf blades, peduncles, and pedicels entirely glabrous; corolla yellow; calyx lobes narrowly lanceolate, membranous. *B. macropoda.*

Leaf blades, peduncles, and pedicels at least slightly strigillose; corolla orange or red; calyx lobes ovate to ovate-lanceolate, thicker .... *B. laxiflora.*

Corolla lacking a hairy ring within; calyx lobes 5–6 mm. long, suborbicular, obtuse or rounded.

Corolla and ovary puberulous; calyx lobes white . . . *B. triflora.*

Corolla and ovary glabrous; calyx lobes green . . . . *B. formosa.*

Corolla spurred at the base, horizontal in the calyx; disk pubescent, strongly thickened posteriorly. Flowers in a pedunculate umbel.

Calyx lobes slightly toothed; ovary sericeous; stems and leaf veins beneath lanate-tomentulose .... *B. Wendlandiana.*

Calyx lobes entire; ovary glabrous; stems and leaf veins beneath strigillose.

Corolla yellow, bilabiate, purple-spotted in the throat, 2.3–3 cm. long, pilosulous externally; calyx lobes ovate-lanceolate, 12–14 mm. long, pilosulous; primary leaf veins about 8 pairs. *B. acropoda.*

Corolla scarlet, the limb regular, not spotted, 1.5 cm. long, glabrous; calyx lobes suborbicular, 7 mm. long, glabrous; leaf veins 16 or 17 pairs.

Leaf blades entire; corolla spur not uncinate . . . . *B. imbricans.*

Besleria acropoda Donn. Smith, Bot. Gaz. 54: 240. 1912. Known only from the type, Tsaki, Prov. Limón, 200 meters, *Tonduz 9554*. A shrub; stems terete, sparsely strigillose; petioles strigillose, 1–2 cm. long; leaf blades elliptic, the larger 11 cm. long and 5.5 cm. wide, abruptly acuminate, attenuate and decurrent at the base, membranous, deeply serrate, glabrous above, strigillose on the veins beneath, the primary veins about 8 pairs; common peduncles axillary but subterminal by reduction of the main axis, 1.8–2.3 cm. long, glabrous, the pedicels umbellate, few, about 1 cm. long, glabrous; calyx lobes ovate-lanceolate, unequal (the larger 14 mm. long), free, entire, membranous, oblique, sparsely pilosulous on both sides; corolla yellow, 23–30 mm. long, horizontal in the calyx, spurred at the base (3 mm. or more), the tube ampliate upwardly, a little ventricose, sparsely pilosulous externally, the limb bilabiate, 15 mm. wide, the lobes spotted with purple; ovary glabrous; disk enlarged posteriorly, pubescent.

Besleria barbensis Hanst. Linnaea 34: 319. 1865–66. In forest, Volcán de Barba, *Hoffmann 45.* Central mountains at middle elevations. Endemic. An herb. 1–1.2 meters high; stems angled, sparingly strigose; petioles 2–2.5 cm. long; leaf blades broadly elliptic, the largest 15 cm. long and 8.5 cm. wide, short-acuminate, obtuse or cuneate at the base, oblique, membranous, irregularly serrate, substrigose on the veins beneath, the primary veins 12–13 pairs; common peduncle absent, the pedicels solitary, axillary, 1.5–2 cm. long, sparingly pilosulous; calyx lobes ovate, 12–15 mm. long, free, sharply serrate, sparsely pilosulous externally, puberulous within; corolla orange, erect, not spurred or saccate at the base, the tube about 15 mm. long, 8 mm. wide, sparsely pilose externally, glabrous within, the limb bilabiate, the lobes spreading, the largest 9 mm. long and broad; androecium glabrous; ovary pilose at the apex; disk annular, thick, glabrous.

Besleria columneoides Hanst. Linnaea 34: 322. 1865–66. San Miguel, *Wendland 762.* Endemic. Stems densely hirsute; petioles 2.5 cm. long, hirsute; leaf blades elliptic, up to 22.5 cm. long and 8.5 cm. wide, cuneate at the base, hirsute beneath, especially on the veins, the primary veins 8–9 pairs; pedicels 0.8–1.4 cm. long; calyx yellow, 10 mm. long, the lobes free, lanceolate, acuminate, externally long-pilose, glabrous within, bearing 2–4 subulate teeth; corolla scarcely longer than the calyx, 4 mm. wide, copiously red-villous, the lobes glabrous externally, long-ciliate; ovary villous at the apex; disk subentire.

Besleria formosa Morton, sp. nov.—Frutex 1.5–2.5 m. altus, caulibus angulatis strigosis, mox glabris; petioli 1–2 cm. longi; lamina foliorum lanceolata, usque ad 8 cm. longa et 2.7 cm. lata, acuminata, basi attenuata, supra viridis, glabra vel sparse strigosa, subtus pallida, glabra, venis strigosis exceptis, venis primariis ca. 5-jugis; pedunculus communis brevis, usque ad 7 mm. longus, pedicello solitario, 2.5–4 cm. longo, strigoso; calycis lobi coriacei obtusi, pallide virides, glabri vel sparse strigillosi; corolla aurantiaco-rubra, crassa, 18–19 mm. longa, ecalcarata, basi paullo gibbosa, tubo utrinque glabro, limbo patente angusto, lobis obtusis; androeceum glabrum, antheris connatis; ovarium glabrum; stylus puberulus; discus uno latere interruptus.—Yerba Buena, Prov. Heredia, alt. 2,000 meters, *Standley & Valerio 49926* (type in U. S. Nat. Herb., No. 1,306,250). Same locality, *Standley & Valerio 49839*. Cerros de Zurquí, Prov. Heredia, *Standley & Valerio 50527, 50695*. Cerro de Las Caricias, Prov. Heredia, *Standley & Valerio 52112*. Cerro Gallito, *M. Valerio 1216*.

Besleria hirsuta (Oerst.) Hanst. *Gasteranthopsis hirsuta* Oerst. Siquirres, Prov. Limón, *Donn. Smith 6714*. Mexico. A shrub; stems hirsute; petioles up to 6.5 cm. long, hirsute; leaf blades oblong, up to 23 cm. long and 9.5 cm. wide, attenuate at the base, obsoletely serrulate, hirsute on the veins beneath, the primary veins 11–13 pairs; pedicels hirsute, about 1 cm. long; calyx about 5 mm. long, the lobes free, oblong or suborbicular, rounded, membranous, short-pilosulous; corolla about 18 mm. long, glabrous on both sides; ovary glabrous; disk annular.

Besleria imbricans Donn. Smith, Bot. Gaz. 25: 155. 1898. Known only from the type, Shirores, Prov. Limón, sea level, *Tonduz 9192*. Stems minutely puberulous, soon glabrous; petioles up to 4 cm. long; leaf blades elliptic, up to 23 cm. long and 11 cm. wide, cuneate and oblique at the base, membranous, entire, strigillose on the veins beneath, the primary veins 16–17 pairs; common peduncle glabrous, about 8.5 cm. long, the pedicels short, few; calyx lobes orange, suborbicular, about 7 mm. long, imbricate, membranous, glabrous, entire, not ciliate, unequal; corolla scarlet, horizontal in the calyx, 15 mm. long, spurred at the base (1.5 mm.), the tube glabrous, ventricose upwardly, the throat contracted, the limb small, terminal; androecium glabrous; ovary glabrous; disk pubescent, enlarged posteriorly.

Besleria imbricans var. **uncinata** Morton, var. nov.—A var. *typica* foliis minoribus serratis, corollae calcare longiore paullo uncinato differt.—Las Vueltas, Tucurrique, Prov. Cartago, alt. 900–1,000 meters, *Tonduz 13038* (type in U. S. Nat. Herb., No. 1,336,615).

Besleria laxiflora Benth. *Besleria chiapensis* Brandeg. Low elevations, Atlantic and Pacific coasts. Mexico to Brazil and Colombia. A shrub or suffrutescent herb; stems densely strigose when young; petioles up to 5 cm. long; leaf blades elliptic or narrowly oblong, up to 21 cm. long and 8.5 cm. wide, usually smaller, serrulate, cuneate at the base, sparsely strigillose on the midrib and veins beneath, the primary veins 5–10 pairs; peduncles up to 4.5 cm. long, commonly equaling or exceeding the umbellate or subcymose pedicels; calyx exceedingly variable, 7.5–14 mm. long, orange or red, one-third to one-half the length of the corolla, the lobes ovate or ovate-lanceolate, subcoriaceous, nearly free, attenuate into a mucro; corolla red or orange, erect, not saccate or spurred at the base, up to 22 mm. long, slightly ventricose, glabrous without, bearing a hairy ring within at the insertion of the stamens, glandular within the throat; ovary glabrous; disk annular.

Besleria macropoda Donn. Smith, Bot. Gaz. 25: 155. 1898. Damp woods, El Recreo, *Pittier 572.* Low elevations, Atlantic coast. Endemic. An herb; young stems closely strigillose, the older ones glabrous; petioles 5–15 mm. long; leaf blades oblong to elliptic, 10–14 cm. long, 3.5–5 cm. wide, cuneate at the base, denticulate, glabrous, the primary veins about 11 pairs; peduncle 6–13 cm. long, the pedicels 5–9, about 2 cm. long; calyx lobes subulate-lanceolate, 10–12 mm. long, glabrous, free; corolla yellow, slightly ventricose, 15–18 mm. long, glabrous without, with a hairy ring within at the insertion of the filaments, glandular-pilose within the throat; ovary glabrous; disk annular.

Besleria notabilis Morton, sp. nov.—Frutex 1 m. altus, caulibus 1 cm. diam., angulatis, appresso-pubescentibus; petioli 3 cm. longi, crassi, pubescentes; lamina foliorum elliptica, usque ad 22 cm. longa et 10 cm. lata, breviter acuminata, basi cuneata, subcoriacea, integra, subtus puberula, venis marginibusque subtomentosis, venis primariis 6–8-jugis; calycis lobi oblongi, 3 mm. longi, 1.5 mm. lati, obtusi liberi ciliolati, extus parce puberuli intus glabri; corolla flavescenti-aurea, 9–10 mm. longa, erecta ecalcarata, tubo 2 mm. lato, utrinque glabro, limbo terminali angusto, lobis parvis obtusis aequalibus; androeceum glabrum; ovarium apice minute puberulum; stylus glaber; discus annularis glaber; bacca alba, calyce purpureo suffulta. —La Palma, Prov. San José, alt. 1,500 meters, *Werklé* (Herb. Nac. Cost. *11603;* type in U. S. Nat. Herb., No. 588,468). La Hondura, Prov. San José, *M. Valerio 749.* La Palma, *M. Valerio 1412; Tonduz 7456.* Cerro de La Palma near San Ramón, Prov. Alajuela, *Brenes 3750.* Pejivalle, Prov. Cartago, *Standley & Valerio 49121.* A specimen from Cricamola Valley, Prov. Bocas del Toro, Panama (*Cooper 197*) is possibly to be referred to this species.

Besleria princeps Hanst. Linnaea 34: 317. 1865–66. *Chirrite.* Costa Rica, without special locality, *Wendland.* Central mountains, 600–1,600 meters elevation; Pejivalle; region of San Ramón. Endemic. Stems densely short-hirsute; petioles hirsute, 1–3.5 cm. long; leaf blades elliptic, up to 13 cm. long and 6 cm. wide, acute or short-acuminate, rounded or obtuse at the base, entire, membranous, tuberculate above, the tubercles surmounted by a long hair, soft-hirsute beneath, the primary veins 7–10 pairs; common peduncle absent, the pedicels solitary, axillary, 2.5–4 cm. long, pilose; calyx lobes lanceolate, 15–17 mm. long, long-acuminate, erect, nearly free, irregularly sharp-serrate, densely sericeous-villous externally, glabrous within; corolla bright orange, erect, not spurred or gibbous at the base, the tube posteriorly about 15 mm. long, anteriorly about 20 mm. long, 7–8 mm. wide at the middle, externally pilose, bearing a dense, hairy ring within near the base, the throat oblique and densely pubescent within, the limb bilabiate, widely spreading, 20–35 mm. wide, the posterior lobes about 1 cm. long and wide, the lateral lobes about 15 mm. long and 20 mm. wide, the anterior about 12 mm. long and 14 mm. wide, narrowed at the base; filaments and anthers densely pilosulous; ovary and style densely villous; disk annular, low, glabrous.

Besleria pycnosuzygia Donn. Smith, Bot. Gaz. 52: 53. 1911. Forests at La Palma, Prov. San José, 1,460 meters, *Tonduz 12545*. Known only from La Palma. An epiphytic shrub, the stems unbranched, strigillose at the apex; leaves subequal, petiolate, the petiole up to 2 cm. long, the blades oblanceolate, up to 14 cm. long and 5 cm. wide, acuminate at the apex, attenuate at the base, subcoriaceous, entire, green above, pale beneath, glabrous above, minutely and sparsely strigillose beneath; flowers fasciculate, the pedicels up to 1 cm. long, strigose, the bracts small, oblong; calyx lobes oblong, 7 mm. long, erect, obtuse, entire, puberulous externally, pilose within near the middle; corolla scarlet, 21–24 mm. long, erect in the calyx, gibbous at the base, long-pilose externally, glandular-pilose within toward the base, the tube curved, scarcely ampliate or ventricose, slightly contracted in the throat, the limb narrow, about 5 mm. wide, regular, the lobes minute; anthers transversely oblong, 1 mm. long, 2 mm. broad, connate in pairs, the cells not confluent; ovary villous; disk annular, thick, glabrous, slightly interrupted dorsally. Because of the non-confluent anther cells the proper generic position of this species is doubtful.

Besleria robusta Donn. Smith, Bot. Gaz. 25: 156. 1898. Forests of Tsaki, Talamanca, *Tonduz 9556*. Low elevations in the Province of Limón. Panama. A shrub; stems 8–10 mm. thick, densely tomentose; petioles 2.5–5.5 cm. long, thick; leaf blades obovate, up to 32 cm. long and 17.5 cm. wide, subcoriaceous, entire, cuneate at the base, subtomentose on the veins beneath and on the margins, the primary veins 11–12 pairs; pedicels densely sericeous, 6–10 mm. long, elongating in fruit; calyx 10–12 mm. long, the lobes free, oblong-ovate, acute, coriaceous, entire, densely sericeous without, glabrous within; corolla orange, 9–14 mm. long, ventricose, glabrous except for the glandular throat within; ovary glabrous; disk annular.

Besleria solanoides HBK. *B. acutifolia* Benth. *Parabesleria costaricensis* Oerst. Centralamer. Gesner. 53. 1858 (Turrialba, 900 meters, *Oersted*). *B. costaricensis* Hanst. Linnaea 34: 330. 1865–66. Central mountains at middle elevations; Guanacaste. Honduras to Peru. A shrub 1.5–3 meters high; stems strigose upwardly, almost glabrous below; petioles 5 cm. long or less; leaf blades elliptic, up to 15 cm. long and 5.5 cm. wide, cuneate at the base, inconspicuously denticulate, strigillose on the veins beneath, otherwise glabrous or almost, the primary veins 6–8 pairs; pedicels few, up to 2 cm. long; calyx lobes oblong, 3–4 mm. long, obtuse, free, membranous, not concave, faintly nerved, nearly glabrous, ciliolate; corolla orange, 13–15 mm. long, erect, not spurred or saccate at the base, ventricose upwardly, glabrous externally, lacking a hairy ring within; androecium glabrous; ovary and style glabrous; disk entire, glabrous; berry orange.

Besleria solanoides var. **tenera** Morton, var. nov.—A var. *typica* corolla paullo puberula, ovario piloso differt.—Cerro de La Carpintera, Prov. Cartago, alt. 1,500–1,850 meters, *Standley 35554* (type in U. S. Nat. Herb., No. 1,227,167). Estrella, Prov. Cartago, *Cooper 5879.*

Besleria Standleyi Morton, sp. nov.—Frutex 1 m. altus, caulibus crassis, 4 mm. diam., sericeis; petioli 1.5–2.5 cm. longi, sericei; lamina foliorum late elliptica, usque ad 18 cm. longa et 10 cm. lata, obtusa, basi obtusa vel cuneata, denticulata, supra viridis glabra, subtus pallida, minute sericea, venis primariis ca. 10-jugis; pedunculus communis obsoletus, pedicellis numerosis, in axillis foliorum dense aggregatis, ca. 10 mm. longis, apice incrassatis, brunneo-sericeis; calycis lobi suborbiculares, 4.5 mm. longi, rotundati venosi suberosi ciliolati, extus sericei; corolla aurantiaca, 13 mm. longa, erecta vel obliqua, ecalcarata, basi saccata, paullo ventricosa, tubo 5–6 mm. lato, fere glabro, annulo piloso carente, limbo terminali angusto, lobis parvis rotundatis aequalibus; androeceum glabrum; ovarium pilosulum; stylus crassus; discus annularis integer, glaber.—La Palma, Prov. San José, alt. 1,600 meters, *Standley 33005* (type in U. S. Nat. Herb., No. 1,226,074).

Besleria trichostegia Donn. Smith, Bot. Gaz. 61: 380. 1916. Tsaki, Prov. Limón, 200 meters, *Tonduz 9558*. Endemic. Stems slender, sparingly hirsute; petioles hirsute, up to 2 cm. long; leaf blades oblanceolate, up to 17 cm. long and 6.5 cm. wide, narrowed at the base, entire, ciliate, hirsute beneath, especially on the veins, the primary veins 7–10 pairs; pedicels few, 8–13 mm. long, hirsute, very slender; calyx 5–6 mm. long, the lobes free, linear-lanceolate, about 7 mm. wide at the base, entire, long-pilose; corolla red, 11–13 mm. long, pilose without, glabrous within at the insertion of the filaments, sparsely pilose within the throat; ovary pilose; disk semiannular.

Besleria triflora (Oerst.) Hanst. Linnaea 34: 329. 1865–66. *Parabesleria triflora* Oerst. Centralamer. Gesner. 53. *pl. 6*. 1858. *B. triflora* var. *subcorymbosa* Donn. Smith, Bot. Gaz. 61: 380. 1916 (La Palma, Prov. San José, 1,460 meters, *Tonduz 7453*). Mountains of Naranjo, 1,200–1,500 meters, *Oersted*. Central mountains, 1,300–2,400 meters; region of San Ramón. A shrub; stems sparingly strigose; petioles 1.5–3 cm. long, strigose; leaf blades elliptic, up to 15 cm. long and 7 cm. wide, usually much smaller, entire, membranous, cuneate at the base, nearly glabrous at maturity, the primary veins 5–7 pairs; peduncles variable in length, commonly shorter than the petioles; pedicels umbellate, subcorymbose, usually longer than the peduncle; calyx white at maturity, 5–6 mm. long, the lobes free, suborbicular, ciliolate, strigillose externally, the margins subscarious; corolla orange-red, about 15 mm. long, puberulous without, the limb about 7 mm. broad, scarcely wider than the corolla tube; ovary hairy; disk annular; berry white.

Besleria Wendlandiana Hanst. Linnaea 34: 318. 1865–66. Costa Rica, without definite locality, *Wendland 568*. Central mountains, 900–2,400 meters elevation; Pejivalle; region of San Ramón. Chiriquí region, Panama. Stems densely lanate-tomentulose; petioles tomentulose, up to 2 cm. long; leaf blades elliptic, up to 20 cm. long and 9 cm. wide, cuneate at the base, serrate, lanate-puberulous on the veins beneath, the primary veins about 13 pairs; common peduncle elongate, up to 9 cm. long, the pedicels numerous, about 1 cm. long; calyx green, the lobes ovate-lanceolate, 8–12 mm. long in anthesis, up to 16 mm. long in fruit, callose-serrulate, sparsely pilosulous; corolla yellow, 18–23 mm. long, horizontal, spurred at the base, the tube cylindric, not ventricose, externally pilosulous, the limb terminal, 10 mm. wide; ovary sericeous; disk villosulous, thicker posteriorly.

CAMPANEA Dcne.

Suffrutescent herbs, shrubs, or short-climbing vines; leaves opposite, equal, petiolate, crenate-serrate; common peduncles elongate, axillary, pendent, one–several-flowered; calyx large, the tube costate, the lobes spreading, entire, pubescent; corolla large, open-campanulate, erect in the calyx, not spurred, the tube not ventricose, hairy externally, not contracted in the throat, yellowish green, the limb broad, subregular, the lobes spreading, purple-spotted within; filaments pilosulous; anthers connate, the cells divergent, oblong, not confluent; ovary over half inferior; style thick, exserted; stigma stomatomorphic; disk glands 5, free, large, glabrous; fruit capsular, opening by 2 valves.—One additional species is found in Central America.

Leaf blades soft-tomentose on both sides............*C. Humboldtii.*
Leaf blades pilosulous on both sides or glabrous above. .*C. Oerstedii.*

Campanea Humboldtii (Klotzsch) Oerst. Centralamer. Gesner. 34. 1858. *Rhytidophyllum Humboldtii* Klotzsch in Otto & Dietr. Allgem. Gartenz. 20: 18. 1852. Veragua, Panama. *Warscewicz.* Central mountains, 1,100–2,100 meters; region of San Ramón. Shrubs or shrubby vines to 2 meters or more; stems and petioles softly brown-tomentose; leaf blades oblong-lanceolate, oblique, up to 19 cm. long and 8 cm. wide, acuminate, brown-tomentose on both sides, at least when young; peduncles 10–16 cm. long, 1–4-flowered, the flowers nodding; calyx lobes ovate, 15 mm. long or more, 5-nerved, pubescent on both sides; corolla 4–5 cm. long, 1.7–2 cm. wide, densely brown-tomentose externally, the limb 3–4 cm. wide.

Campanea Oerstedii (Klotzsch) Oerst. Centralamer. Gesner. 34. *pl. 1, 2.* 1858. *Rhytidophyllum Oerstedii* Kl. in Otto & Dietr. Allgem. Gartenz. 20: 17. 1852. Between Candelaria and Cartago, 1,800–2,100 meters, *Oersted.* Common in the central mountains, 1,300–1,800 meters; Zarcero. Endemic. Similar to the preceding but always herbaceous, frequently epiphytic and pendent, not over 1 meter long, the stems often more coarsely hirsute, the leaf blades scabrous-pilosulous above, pilosulous beneath chiefly on the veins and veinlets, often reddish beneath; calyx lobes narrower, commonly oblong-lanceolate, usually 3-nerved. This species has often been confused with *Campanea grandiflora* (HBK.) Dcne. of Colombia.

Campanea Oerstedii var. **laevis** Morton, var. nov.—A var. *typica* foliis supra semper glaberrimis differt.—La Palma, Prov. San

José, 1,450–1,550 meters, May 6–8, 1906, *Maxon 448* (type in U. S. Nat. Herb., No. 1,336,367).

CENTROSOLENIA Benth.

Epiphytic, scandent shrubs; flowers in sessile or short-pedunculate, axillary umbels, the bracts linear or subulate, the pedicels short, numerous; calyx lobes oblique, oblong-linear to subulate, acuminate, free, entire, or serrulate near the apex, hirsute, unequal, the posterior one shorter, saccate at the base; corolla horizontal in the calyx, spurred at the base, the tube ampliate upwardly or abruptly ventricose, not contracted in the throat, the limb spreading, subbilabiate; filaments inserted high in the corolla tube, contorted, glabrous; anthers connate, quadrate, the cells discrete or divergent, glabrous or bearded, dehiscent only part of their length; ovary villous; disk glands 1 or 2; lamellae of the placentae ovuliferous on the inner surface only.—One or two additional species, represented by incomplete material, occur in Costa Rica.

Anthers bearded at the apex; leaf blades attenuate and decurrent into the petioles................................*C. decurrens.*

Anthers glabrous; leaf blades rounded at the base, not decurrent, very long-petiolate..........................*C. longipetiolata.*

Centrosolenia decurrens Morton, sp. nov.—Frutex scandens, caulibus elongatis vel raro abbreviatis, novellis rubro-hirsutis; folia petiolata, petiolo brevi vel usque ad 11 cm. longo, sursum alato; lamina foliorum oblanceolata, usque ad 29 cm. longa et 10.5 cm. lata, acuminata, basi attenuata et longe in petiolum decurrens, chartacea, denticulata, supra strigosa, subtus pallida strigosa, in venis rubro-hirsuta, venis primariis ca. 8-jugis; flores umbellati, pedunculo communi subnullo, bracteis subulatis, ca. 1 cm. longis, pedicellis numerosis 1–1.5 cm. (raro 3.5 cm.) longis, rubro-hirsutulis; calycis lobi virides, subulati, 12–17 mm. longi, 1 mm. lati, integri, rubro-hirsutuli, paullo inaequales, posticus minor, basi saccatus; corolla ochroleuca, rubro-tincta, ca. 4 cm. longa, basi calcarata (2.5 mm.), in calyce horizontalis, tubo extus rubro-pilosulo, supra basin angustato, in medio deflexo et abrupte ventricoso, tum angustato, faucem versus paullo ampliato, limbo patente, subbilabiato, lobis subintegris; filamenta gracilia, glabra, contorta, alte in corollae tubo affixa; antherae connatae, quadratae, loculis oblongis, ca. 1.2 mm. longis, divergentibus, apice perspicue barbatis; ovarium rubro-villosum; stylus pilosulus; disci glandula postica oblonga glabra; placentae lamellae intus solum ovuliferae.—Finca Montecristo, on Río Reventazón, below El Cairo, Prov. Limón, alt. 25 meters, Feb. 18–19, 1926, *Standley & Valerio 48589* (type in U. S. Nat. Herb., No. 1,305,619). Same locality, *Standley & Valerio 48416*. La Concepción, Llanuras de Santa Clara, Prov. Limón, *Donnell Smith 6732*. Vicinity of Guápiles, Prov. Limón, alt. 300–500 meters, *Standley 37022, 37238, 37501, 37553*. The barbate anthers ally this with *Centrosolenia glabra* Benth. The Costa Rican record for **Centrosolenia congesta** (Oerst.) Morton, comb. nov. (*Trichodrymonia congesta* Oerst. Dansk. Vid. Selsk. Skrivt. V. 5: 112. 1861), a species of Mexico, is based on specimens of *C. decurrens*.

Centrosolenia longipetiolata (Donn. Smith) Morton, comb. nov. *Episcia longipetiolata* Donn. Smith, Bot. Gaz. 25: 152. 1898. Known only from the type, Carillo, alt. 300 meters, *Pittier 2493*. Leaves long-petiolate (about 25 cm.), the blades broadly elliptic, 22–25 cm. long, 12–16 cm. wide, short-cuspidate, rounded at the base, membranous, inconspicuously denticulate, glabrous on both sides, the primary veins 14–15 pairs; inflorescence congested, the common peduncle short, bracteate, the bracts subulate, 18–25 mm. long, pilosulous, the pedicels about 6 mm. long, numerous; calyx lobes narrowly linear, about 15 mm. long, 1 mm. wide, entire, pilosulous, unequal, the posterior shorter; corolla tubular, about 3 cm. long, spurred at the base, horizontal in the calyx, the tube not ventricose, about 2 mm. wide, slightly enlarged in the throat, the limb about 1 cm. wide, the lobes fimbriate; anthers subquadrate, 1 mm. long, not bearded.

CODONANTHE (Mart.) Hanst.

Codonanthe crassifolia (Focke) Morton, comb. nov. *Hypocyrta crassifolia* Focke, Tijdschr. Nat. Wetens. 5: 199. 1852. *C. macradenia* Donn. Smith, Bot. Gaz. 25: 154. 1898 (Boruca, 460 meters, *Tonduz 6769*). *C. confusa* Sandw.; *C. calcarata* auct., non Hanst. Low elevations, Atlantic and Pacific coasts. Panama to northern South America. Epiphytic, herbaceous vines with glabrous, shining stems; leaves of a pair equal, short-petiolate (4–5 mm.), the blades ovate or oval, up to 3.5 cm. long and 2 cm. wide, fleshy, entire, obtuse at both ends, glabrous throughout; flowers solitary, axillary, short-pedicellate; calyx lobes 5, free, subulate, 7–9 mm. long, entire, puberulous on both sides, oblique and slightly unequal; corolla white or yellowish, about 2 cm. long, horizontal in the calyx, spurred at the base, puberulous externally, the tube strongly ampliate upwardly, not contracted in the throat, the limb spreading, oblique, slightly irregular; anthers orbicular, the cells discrete, separated by the enlarged connective; disk gland posterior, large.

COLUMNEA L.

Erect or scandent shrubs; leaves opposite, those of a pair equal or strongly unequal, usually short-petiolate; flowers axillary, solitary or fasciculate, short- or long-pedicellate, usually ebracteate; calyx 5-parted, the lobes nearly free, usually colored, acute or acuminate, often toothed or incised; corolla yellow or red, erect in the calyx, not spurred at the base, often gibbous at the base, the tube hairy, ampliate upwardly, usually not ventricose, the limb regular or often strongly bilabiate; filaments connate, usually not adnate to the corolla except at the very base, the anthers persistently connate, oblong, dehiscent throughout; disk gland posterior, solitary; fruit baccate.—A large, polymorphic genus, reaching its best development in Costa Rica.

Corolla limb regular or slightly bilabiate.
  Leaves of a pair equal; calyx lobes entire (*Stygnanthe*). *C. calotricha.*
  Leaves of a pair strongly unequal; calyx lobes often pectinate-toothed.
    Corolla yellow; flowers fasciculate, subsessile or short-pedicellate; erect shrubs (*Collandra*).
      Leaf blades glabrous above or nearly so, marked with scarlet spots on the lower surface.
        Calyx lobes entire or nearly so........... *C. consanguinea.*
        Calyx lobes pectinate-toothed.................. *C. florida.*
      Leaf blades pilose above, lacking scarlet spots.
        Calyx equaling or exceeding the corolla; corolla sericeous. *C. purpurata.*
        Calyx one-half as long as the corolla or less; corolla pilose. *C. aureonitens.*
    Corolla scarlet; flowers solitary or paired, long-pedicellate; epiphytic, pendent shrubs.
      Leaves glabrous above; calyx lobes pectinate-fimbriate (*Stenanthus*).
        Leaf blades serrate; stems villous at the apex. .*C. serrata.*
        Leaf blades subentire; stems appressed-pubescent.

Pedicels exceeding the leaves; teeth of calyx lobes not or scarcely longer than the width of the lobe. *C. grata.*

Pedicels half as long as the leaves or less; teeth of the calyx lobes much longer than the width of the lobe. *C. sanguinolenta.*

Leaves hirsute above; calyx lobes entire, serrate, or with a few subulate teeth (*Ortholoma*).

Calyx lobes subserrate.......................*C. acuminata.*

Calyx lobes entire or with a few subulate teeth.

Leaves lanceolate, purple beneath..........*C. ochroleuca.*

Leaves oblanceolate, green beneath..*C. Warszewicziana.*

Corolla limb strongly bilabiate, the lower lobe linear, reflexed.

Leaves of a pair strongly unequal, purple-spotted beneath; flowers fasciculate, short-pediceled, conspicuously bracteate (*Cryptocolumnea*)..................................*C. praetexta.*

Leaves of a pair equal or nearly so, not purple-spotted beneath; flowers usually solitary, pedicellate (*Eucolumnea*).

Corolla densely sericeous externally, the tube not much exceeding the calyx; filaments puberulous.

Leaf blades linear; calyx lobes 12–14 mm. long....*C. linearis.*

Leaf blades not linear; calyx lobes 2–3 cm. long (except in *C. verecunda*).

Corolla 4 cm. long or less.

Calyx lobes oblong-lanceolate, 3–5 mm. wide at the base. *C. querceti.*

Calyx lobes linear-subulate, not over 2 mm. wide. *C. verecunda.*

Corolla 6–8 cm. long.

Leaf blades strigillose beneath; epidermis of the stem peeling off in scales..................*C. lepidocaula.*

Leaf blades appressed-pilose beneath; epidermis not peeling off in scales................*C. nicaraguensis.*

Corolla pilose externally, the tube much exceeding the calyx; filaments glabrate (except in *C. magnifica*).

Calyx lobes toothed.

Stems and leaves strigose.

Calyx lobes deeply pinnatifid...............*C. flaccida.*

Calyx lobes slightly toothed at the base. . *C. Oerstediana.*
Stems and leaves not strigose.
Stems and leaves tomentose. . . . . *C. tomentulosa.*
Stems and leaves pilose or hirtous.
Pedicels shorter than the calyx. . . . . *C. hirta.*
Pedicels longer than the calyx. . . . . *C. magnifica.*
Calyx lobes entire.
Calyx lobes broadest above the base.
Stem hairs spreading.
Leaf blades suborbicular, 1 cm. long or less. *C. macrophylla.*
Leaf blades oblong-elliptic, 2–5 cm. long. . . . *C. localis.*
Stem hairs subappressed; leaf blades 1.5–2.5 cm. long. *C. microcalyx.*
Calyx lobes broadest at the base.
Stems hirsute; leaf blades hirsute on both sides.
Pedicels 5 mm. long or less. . . . . *C. hirta.*
Pedicels 2–2.5 cm. long. . . . . *C. gloriosa.*
Stems strigose; leaf blades strigose beneath, glabrous above.
Calyx lobes ovate. *C. Oerstediana.*
Calyx lobes linear-lanceolate.
Calyx lobes densely white-sericeous. . . . *C. oxyphylla.*
Calyx lobes strigose near the base. . . . . *C. glabra.*

Columnea acuminata Benth. *Ortholoma acuminatum* Hanst. Colombia. Reported from Costa Rica by Oersted. Near *C. Warscewicziana,* but the calyx lobes serrate, not entire or subulate-toothed.

Columnea aureonitens Hook. Atlantic coastal region. Colombia. Leaves strongly unequal, the larger ones oblanceolate, up to 21 cm. long, serrate, densely red-pilose on both sides, not red-spotted; flowers fasciculate, pedicellate, the bracts deciduous; calyx lobes green, 13 mm. long, pectinate-toothed, brown-hirsute; corolla yellow, about 3.5 cm. long, pilose, the limb regular, about 7 mm. wide, the lobes suborbicular, erect. The Costa Rican plant may be specifically distinct from the Colombian type.

Columnea calotricha Donn. Smith, Bot. Gaz. 40: 9. 1905. Atirro, *Donn. Smith 6728*. Guatemala. An erect herb, the stems unbranched, red-hirsute; leaves subequal, petiolate (11–14 mm.), the blades oblong-elliptic, obtuse, cuneate at the base, remotely crenulate, pilose on both sides, red beneath; pedicels 6–8 mm. long; calyx lobes spatulate-oblong, 13–15 mm. long, obtuse, pilose, entire; corolla reddish, tubular, 3 cm. long, long-hirsute, the tube not ventricose, the limb small, about 6 mm. wide, nearly regular, the lobes small, erect, subequal.

Columnea consanguinea Hanst. Linnaea 34: 383. 1865–66. Turrialba, *Wendland 509*. Central mountains, 1,200–1,700 meters; region of San Ramón. Endemic. An epiphytic shrub with unbranched stems, 1.2 meters high; leaves unequal, the larger ones narrowly oblanceolate, up to 25 cm. long, entire, above glabrous, not red-spotted, beneath appressed-pilose, red-spotted, the smaller ones linear-lanceolate, about 2.5 cm. long; flowers fasciculate, the bracts persistent, entire, strigose; calyx lobes green, lanceolate, about 2 cm. long, entire, strigose; corolla yellow, tubular, about as long as the calyx, densely sericeous, the limb narrow, regular, the lobes erect.

Columnea flaccida Seem. Atlantic and Pacific coasts, at low elevations. Panama. An epiphytic, branched shrub, with slender, strigose stems; leaves subequal, very short-petiolate, the blades oblong-lanceolate, long-acuminate, about 3.5 cm. long, subentire, subcoriaceous, sparingly strigose on both sides; pedicels shorter than the calyx; calyx lobes red, linear-lanceolate, about 13 mm. long, deeply pinnatifid, red-hirsute; corolla red, 5–6 cm. long, gibbous at the base, pilose externally, the tube 4 cm. long, lateral lobes free for about 9 mm., the lower lobe ovate, about 1 cm. long; filaments glabrous.

Columnea florida Morton, Journ. Wash. Acad. Sci. 27: 310. 1937. Vicinity of El General, Prov. San José, 915 meters, *Skutch 2436*. Pacific drainage, 500–1,100 meters. Panama. An epiphytic shrub with thick, hirsute stems; leaves opposite, strongly unequal, the larger ones short-petiolate, oblanceolate, up to 35.5 cm. long and 10.5 cm. wide, short-acuminate, entire, glabrous above and bearing 2 red spots, appressed-pilose beneath, red-spotted, the smaller leaves narrowly elliptic, about 3 cm. long, subsessile; flowers fasciculate, the pedicels up to 1 cm. long, bracteate, the bracts small, deciduous; calyx lobes ovate, 1.5–2.3 cm. long, densely brown-hirsute, pectinate-dentate; corolla yellow, about 2.5 cm. long, cylindric, densely brown-hirsute, the limb subregular, about 5 mm. wide, the lobes suborbicular, 2.5 mm. long. This species has been misidentified as *C. sanguinea* Hanst.

Columnea glabra Oerst. Centralamer. Gesner. 62. 1858. Mountains between Candelaria and Cartago, 1,800–2,100 meters, *Oersted.* Central mountains, 900–2,000 meters. Endemic. An epiphytic shrub with branched, strigose stems; leaves subequal, very short-petiolate, the blades oblanceolate, up to 3.5 cm. long, rounded at the apex, attenuate at the base, entire, glabrous above, thin-strigose beneath or glabrate; pedicels shorter than the calyx; calyx lobes green, linear-lanceolate, about 15 mm. long, obtuse, entire, subappressed-pubescent near the base; corolla scarlet, about 7 cm. long, the tube about 4 cm. long, pilose externally, not contracted in the throat, the lateral lobes deltoid, acute, free for about 9 mm., the lower lobe linear-oblong, acute, about 15 mm. long; filaments glabrous.

Columnea gloriosa Sprague, Bot. Mag. 137: *pl. 8378.* 1911. Known only from the type, cultivated from Costa Rica. Epiphytic, the stems hirsute; leaves subequal, the blades ovate or ovate-oblong, 2–3.5 cm. long, obtuse, rounded at the base, hirsute above, the nerves impressed, hirsute beneath on the elevated nerves; pedicel 2–2.5 cm. long; calyx lobes broadly ovate, 1.5 cm. long, entire, villous; corolla scarlet, 6.5–8 cm. long, sparsely villous.

Columnea grata Morton, nom. nov. *Columnea heterophylla* Hanst. Linnaea 34: 390. 1865–66, non Roxb. *Stenanthus heterophyllus* Oerst. Centralamer. Gesner. 48. *pl. 5.* 1858. Naranjo, *Oersted.* Pacific and Atlantic coasts, at low elevations. Endemic. A pendent, epiphytic shrub with branched, appressed-pubescent stems; leaves strongly unequal, the larger ones oblanceolate, 10 cm. long, subentire, glabrous above, strigose beneath, usually red-spotted, the smaller ones stipule-like, not over 1 cm. long; flowers solitary, the pedicels pendent, longer than the leaves, bracteate at the base; calyx lobes lanceolate, about 3 cm. long, green, hirsute, pectinate-toothed, the teeth usually shorter than the width of the lobes; corolla scarlet, 4–5 cm. long, pilose, the limb 15–17 mm. wide, subregular.

Columnea hirta Klotzsch & Hanst. Linnaea 34: 403. 1865–66. *C. hirsuta* Kl. ex Oerst. Centralamer. Gesner. 61. 1858, non Swartz. Veragua, Panama, *Warscewicz.* Central mountains. A pendent, branched shrub; stems red-villous; leaves equal, short-petiolate (4–5 mm.), oblong, 2.5–3 cm. long, obtuse, densely pilose on both sides, entire; pedicels 7 mm. long or less; calyx lobes green, linear-lanceolate, about 15 mm. long, with 1 or 2 short teeth on either side, long-pilose; corolla scarlet, about 7 cm. long, pilose, the tube slender, about 4 cm. long, becoming 8 mm. wide in the throat, the galea oblong, 3 cm. long, entire, concave, the lateral lobes oblong, free for about 1 cm., the lower lobe lanceolate, reflexed, about 1.8 cm. long; filaments nearly glabrous.

Columnea lepidocaula Hanst. Linnaea 34: 411. 1865–66. Costa Rica, without locality, *Valentini*. Central mountains, at middle elevations. Endemic. An epiphytic shrub, with coarse stems, the epidermis of which peels off in scales; leaves subequal, short-petiolate, oblanceolate, 5–9 cm. long, acute, narrowed at the base, entire, glabrous above, sparsely strigose beneath; pedicels shorter than the calyx; calyx lobes green, oblong-lanceolate, 2–2.5 cm. long, acute, entire, strigose; corolla 6.5–7.5 cm. long, scarlet, the throat yellow, densely white-sericeous externally, the tube shorter than the limb, little longer than the calyx; filaments densely puberulous.

Columnea linearis Oerst. Centralamer. Gesner. 59. 1858. At 1,800–2,100 meters, *Oersted*. Central mountains, at middle elevations; Atlantic coast. Endemic. An epiphytic shrub, the stems branched, substrigose; leaves subequal, subsessile, the blades linear, 4–8 cm. long, acuminate, entire, glabrous above, strigillose beneath; pedicels shorter than calyx; calyx lobes red, ovate-lanceolate, 12–14 mm. long, acuminate, entire, strigillose; corolla scarlet, about 4 cm. long, white-sericeous externally; filaments puberulous.

Columnea localis Morton, nom. nov. *Columnea microcalyx* var. *macrophylla* Donn. Smith, Bot. Gaz. 31: 118. 1901, non *C. macrophylla* Kuntze. Known only from Tucurrique (type, *Tonduz 12932*). An epiphytic shrub, the stems slender, branched, white-pilose; leaves green, subequal, short-petiolate (1.5 mm.), the blades oblong-elliptic, 2–5 cm. long, 1.1–1.7 cm. wide, acute or obtuse, rounded at the base, membranous, entire, soft-pilose on both surfaces; pedicels solitary, about 14 mm. long, pilose; calyx lobes green, oblanceolate, about 12 mm. long, acute, narrowed at the base, entire, pilose on both surfaces; corolla scarlet, 7 cm. long, gibbous at the base, thin-pilose externally, the tube short (2 cm.), the galea broad, the lateral lobes adnate for most of their length, the lower lobe linear, about 2.2 cm. long.

Columnea magnifica Klotzsch & Hanst. ex Oerst. Centralamer. Gesner. 60. 1858. *?C. Wendlandiana* Hanst. Linnaea 34: 402. 1865–66 (without definite locality, *Wendland*). *?C. oblanceolata* Sprague, Kew Bull. 449. 1908 (without special locality, *Hübsch*). Cerro de Aguacate, *Hoffmann.* Central mountains, 1,400–2,500 meters. Panama. Stems hirsute, unbranched; leaves subequal, lanceolate or oblanceolate, not over 9 cm. long, pilose on both sides, eventually glabrate above, subentire, not red-spotted; flowers solitary, the pedicels about 1.5 cm. long, erect; calyx lobes green, lanceolate, about 15 mm. long, pilose, remotely serrulate; corolla scarlet, up to 7 cm. long, pilose, not narrowed in the throat, strongly bilabiate, the galea entire; filaments densely puberulous.

Columnea microcalyx Hanst. Linnaea 34: 408. 1865–66. Costa Rica, without definite locality, *Wendland 910.* Central mountains, at middle elevations; region of San Ramón. Endemic. A pendent, epiphytic shrub, the stems branched, substrigose; leaves subequal, short-petiolate, the blades lanceolate or ovate-lanceolate, 1.5–2.5 cm. long, acute, rounded at the base, entire, subcoriaceous, glabrate or thin-strigose on both sides; pedicels shorter than the calyx; calyx lobes oblanceolate to obovate, about 12 mm. long, obtuse, narrowed toward the base, entire, pilose, usually reddish within; corolla scarlet, 6–7 cm. long, pilose externally, the tube shorter than the limb; filaments glabrous.

Columnea microphylla Klotzsch & Hanst. ex Oerst. Centralamer. Gesner. 63. 1858. Without definite locality, *Warscewicz.* Central mountains, at middle elevations. Endemic. A small, pendent shrub, the stems slender, red-hirtous; leaves subequal, short-petiolate, the blades oval or suborbicular, 1 cm. long or less, obtuse, entire, pilose on both sides; pedicels shorter than the calyx; calyx lobes oblanceolate, narrowed at the base, obtuse at the apex, about 1 cm. long, entire, long-pilose; corolla scarlet and yellow, about 6 cm. long, pilose externally, the tube shorter than the limb; filaments glabrous.

Columnea nervosa (Klotzsch) Hanst. (*Pentadenia nervosa* Klotzsch ex Oerst.) was reported from Costa Rica, but the locality is in Panama.

Columnea nicaraguensis Oerst. Atlantic coast, at low elevations. Nicaragua. Changuinola Valley, Panama. An epiphytic shrub, the stems closely strigose, the epidermis not peeling in scales; leaves subequal, petiolate (5 mm.), the blades oblong or lanceolate, 7–11 cm. long, acute, rounded at the base, entire, strigillose above, appressed-pilose beneath; pedicels shorter than the calyx; calyx lobes lanceolate or ovate-lanceolate, 2.5–3 cm. long, acuminate, entire, long-pilose at the base, strigose upwardly; corolla red, 6–8 cm. long, densely sericeous externally, the tube not much longer than the calyx; filaments puberulous.

Columnea ochroleuca (Klotzsch) Hanst. (*Ortholoma ochroleucum* Klotzsch ex Oerst.) was reported from Costa Rica, but the locality is in Panama.

Columnea Oerstediana Klotzsch ex Oerst. Centralamer. Gesner. 61. *pl. 8.* 1858. *?C. tenuis* Klotzsch ex Oerst. op. cit. 61 (Veragua, Panama, *Warscewicz*). Naranjo, 1,200–1,500 meters, *Oersted.* Central mountains, at middle elevations. A pendent, epiphytic shrub, the stems branched, strigose; leaves subequal, short-petiolate, the blades ovate, 1–1.5 cm. long, coriaceous, obtuse, rounded at the base, entire, or slightly toothed at the base, glabrous above, thin-strigose beneath; pedicels shorter than the calyx; calyx lobes green, ovate, about 15 mm. long, acute, entire, sparingly pilose, the tube longer than the limb; filaments glabrous.

Columnea oxyphylla Hanst. Linnaea 34: 405. 1865–66. Costa Rica, without definite locality, *Wendland 778.* Low elevations on the Atlantic coast. Endemic. A shrub (0.9–1.5 meters), pendent from trees; stems strigose; leaves subequal, short-petiolate (2 mm.), the blades lanceolate, 3–4 cm. long, 8–10 mm. wide, subcoriaceous, long-acuminate, entire, glabrous above, thin-strigose beneath; flowers solitary, the pedicel about 15 mm. long, white-sericeous; calyx lobes green, linear-lanceolate, about 20 mm. long, long-acuminate, entire, densely white-sericeous; corolla scarlet, about 7 cm. long, erect in the calyx, pilose, the tube about 3 cm. long, not contracted in the throat, the galea about 4 cm. long, obtuse, entire, the lateral lobes oblong, obtuse, free for about 12 mm., the lower lobe reflexed, 2.5 cm. long; filaments glabrous.

Columnea pendula (Klotzsch) Hanst. (*Ortholoma pendulum* Klotzsch ex Oerst.) was reported from Costa Rica, but the locality is in Panama.

Columnea praetexta Hanst. Linnaea 34: 394. 1865–66. Costa Rica, without special locality, *Warscewicz 5.* Known only from the type. Leaves strongly unequal, the larger ones oblanceolate, 20–25 cm. long, villous on both sides, purple-spotted beneath, the smaller ones 2.5–5 cm. long; flowers fasciculate, the pedicels very short, the bracts large, orbicular, crenulate; calyx lobes lanceolate, subentire, villous, about 2.5 cm. long; corolla orange, the tube tomentose, clavate, the throat narrowed, the limb bilabiate.

Columnea purpurata Hanst. Linnaea 34: 386. 1865–66. Costa Rica, without definite locality, *Wendland 548*. Common at elevations from sea level to 1,500 meters; region of San Ramón; Guanacaste. Endemic. A soft-woody shrub with unbranched stem; leaves clustered at the apex, strongly unequal, the larger ones oblanceolate, up to 30 cm. long, serrate, pilose on both sides, not red-spotted, the smaller leaves not over 3 cm. long, long-acuminate; flowers fasciculate, subsessile, bracteate, the bracts scarlet, about 3 cm. long, spinulose-toothed, long-pilose; calyx lobes scarlet, lanceolate, about 3 cm. long, spinulose-toothed, long-pilose; corolla yellow, tubular, 3 cm. long, sericeous, the limb narrow, regular, the lobes erect, 4 mm. long.

Columnea querceti Oerst. Centralamer. Gesner. 59. 1858. *C. erythrocalyx* Klotzsch ex Oerst. loc. cit. (without locality, *Warscewicz*). At 1,800–2,100 meters, *Oersted*. In central mountains, at middle elevations. Endemic. An epiphytic shrub, the stems coarse, the epidermis peeling off in scales; leaves subequal, the blades oblanceolate or linear-oblanceolate, 4–10 cm. long, acute, attenuate at the base, entire, glabrous above, strigillose beneath; pedicels much shorter than the calyx; calyx lobes red, oblong-lanceolate, about 2 cm. long, acute, entire, pilose at the base; corolla scarlet, about 4 cm. long, densely sericeous externally, the tube shorter than the calyx; filaments puberulous.

Columnea sanguinolenta (Klotzsch) Hanst. Linnaea 34: 389. 1865–66. *Stenanthus sanguinolentus* Klotzsch ex Oerst. Centralamer. Gesner. 49. 1858. *S. squarrosus* Klotzsch ex Oerst. loc. cit. (Veragua, Panama, *Warscewicz*). Low elevations, Atlantic and Pacific coastal regions. Panama. An epiphytic shrub, the stems unbranched, appressed-pubescent; leaves strongly unequal, the larger ones oblanceolate, up to 12 cm. long, subentire, glabrous above, appressed-pilose beneath, often red-spotted beneath, the smaller ones stipuliform, less than 1 cm. long; pedicels erect, solitary, axillary, usually less than half as long as the leaves, bracteate at the base; calyx lobes, 2.5–3 cm. long, green or red, hirsute, deeply pectinate-fimbriate, the teeth longer than the width of the lobe; corolla scarlet, about 4 cm. long, pilose, the limb sub-regular, about 12 mm. wide.

Columnea serrata (Klotzsch) Hanst. *Stenanthus serratus* Klotzsch. Veragua, Panama, *Warscewicz.* Doubtfully reported from Costa Rica by Hanstein. Near *C. sanguinolenta,* but the stems hirsute at the apex and the leaf blades serrate, not red-spotted.

Columnea tomentulosa Morton, nom. nov. *Columnea tomentosa* Oerst. Centralamer. Gesner. 64. 1858, non Roxb. Low elevations on the Atlantic coast. Nicaragua. A scandent, branched shrub; stems tomentose; leaves short-petiolate (2 mm.), subequal, the blades oval, 2.5 cm. long or less, obtuse, soft-tomentose on both sides, entire; flowers solitary, the pedicel 1 cm. long or less, white-tomentose; calyx lobes linear, 7–10 mm. long, acuminate, deeply subulate-toothed (the teeth 2–3 to a side), pilose externally, glabrous within; corolla scarlet, 4–4.5 cm. long, gibbous at the base, erect in the calyx, the tube slender, pilose, not contracted in the throat (this 6 mm. wide), the galea oblong, 15 mm. long, obtuse, entire, the lateral lobes triangular, free for about 3.5 mm., the lower linear, reflexed, 8.5 mm. long; filaments glabrous, nearly equaling the galea; style pilosulous; stigma bilobed.

Columnea verecunda Morton, sp. nov.—Frutex epiphyticus, 0.3–0.8 m. altus, caulibus crassis, ca. 6 mm. diam., parce ramosis, hirsutis, inferne squamulis epidermidis retroversis instructis; petioli brevissimi, 3–4 mm. longi, hirsuti; lamina foliorum oblongo-oblanceolata, usque ad 11 cm. longa et 2.5 cm. lata, acuta, basi rotundata, non decurrens, subcoriacea, integra, supra glabrescens, subtus rubra, strigosa, venis primariis ca. 6-jugis; flores fasciculati, axillares, pauci, pedunculo communi nullo, pedicellis 5–6 mm. longis, bracteis minutis, linearibus; calycis lobi liberi, lineari-subulati, 13–15 mm. longi, 2 mm. basi lati, integri, rubri, externe sericei, intus glabri, aequales, erecti; corolla flava vel pallide rubra, 3–4 cm. longa, in calyce erecta, basi parum gibbosa, tubo externe albo-sericeo, sursum gradatim ampliato, 12–15 mm. longo, quam limbo multo breviore, limbo valde bilabiato, galea integra porrecta, lobis lateralibus cum galea alte connatis, lobo inferiore reflexo, lineari, ca. 15 mm. longo; filamenta basi in tubum postice fissum connata, sursum per paria connata, partibus liberis filiformibus, pilosulis, rectis; ovarium villosum; stylus pilosulus; stigma stomatomorphum; disci glandula emarginata, crassa.—Vara Blanca de Sarapiquí, Prov. Alajuela, alt. 1,615 meters, Jan., 1938, *Skutch 3466* (type in U. S. Nat. Herb., No. 1,643,546). Zarcero, Prov. Alajuela, alt. 1,350 meters, *A. Smith H67.* Region of San Ramón, Prov. Alajuela, *Brenes 3708, 4497, 5336, 13584; Solís 497; Tonduz 17825.*

Columnea Warszewicziana (Klotzsch) Hanst. *Ortholoma Warszewiczianum* Klotzsch ex Oerst. *Ortholoma vestitum* Klotzsch ex Oerst. Central mountains, 1,400–2,400 meters; region of San Ramón. Panama. A pendent, epiphytic shrub, the stems branched, 0.6–1.2 meters long, reddish-villous at the apex; leaves strongly unequal, the larger ones oblanceolate, up to 12 cm. long, subserrate, hirsute on both sides, not red-spotted, the smaller ones stipule-like; pedicels up to 4 cm. long, pendent, red-villous; calyx lobes about 1 cm. long, lanceolate, acuminate, villous, entire or with a few subulate teeth; corolla scarlet, 4–5 cm. long, strongly ventricose, pilose, the limb subregular, about 13 mm. wide.

DIASTEMA Benth.

Low, delicate herbs, the stems unbranched, hirsute; leaves green, opposite, subequal, thin-membranous, coarsely toothed; inflorescence axillary or terminal, racemose, bracteate, the bracts opposite; calyx tube turbinate, the lobes free, elongate, entire, green; corolla white, tubular, erect in the calyx, not spurred, not ventricose, not markedly ampliate upwardly, the limb terminal, regular or subbilabiate; anther cells discrete, orbicular; ovary half inferior; style slender, elongate; stigma subbilobed; disk glands 5, linear.—One or two additional species are found in Central America.

Calyx tube and lobes glabrate or sparingly strigose.
  Leaf blades dentate or crenate-dentate..............*D. exiguum.*
  Leaf blades serrate or biserrate....................*D. cristatum.*
Calyx tube and lobes spreading-pilose..............*D. micranthum.*

Diastema cristatum Hanst. Linnaea 34: 438. 1865–66. *?Diastemella bracteosa* Oerst. Centralamer. Gesner. 26. 1858 (Cerro de Aguacate, 360 meters, *Oersted*). *Diastema bracteosum* Hanst. loc. cit. Cerro de Aguacate, *Hoffmann 692*. Atlantic coast; El General; region of San Ramón. From 400–1,100 meters elevation. Endemic. Leaf blades ovate or oblong, pilose above, setulose-pilosulous beneath on the veins and veinlets; inflorescence usually terminal, the common peduncle elongate, glabrate; calyx lobes linear-lanceolate, 3.5–5 mm. long, 1–1.5 mm. wide at the base, ciliate, glabrate or strigose; corolla 15–20 mm. long, sparsely pilose toward the apex, the tube slender, about 4 mm. wide; disk glands long and slender, often equaling the ovary, often clavate.

Diastema exiguum Morton. Pejivalle, 900 meters. Panama. Similar to the preceding, but the leaf blades dentate or crenate-dentate, glabrate, the calyx lobes larger (5–7 mm. long), and the disk glands not clavate.

Diastema micranthum Donn. Smith, Bot. Gaz. 61: 377. 1916. Jérico, Llanuras de Santa Clara, 400 meters, *Pittier 7602*. La Palma de San José; La Hondura. Endemic. Stems and petioles densely pilose; leaf blades pilose on both sides, dentate or dentate-serrate, never biserrate; peduncle and rachis pilose, often reduced, the flowers sometimes appearing as if aggregate in the leaf axils; calyx tube densely spreading-pilose, the lobes sparingly pilose, broadly lanceolate, spreading, often recurved at the apex; corolla 10–18 mm. long; disk glands broadly linear, shorter than the ovary, not clavate. This is perhaps the species mentioned from Costa Rica by Fritsch as *D. pictum* Regel.

DRYMONIA Mart.

Shrubs or vines; leaves opposite, equal, usually long-petiolate; flowers usually solitary, rarely fasciculate; calyx lobes large, broad, 5-parted, free or rarely partially connate, often colored, often toothed or fimbriate; corolla infundibuliform, horizontal in the calyx, spurred at the base, the tube not ventricose, ampliate upwardly, not contracted in the throat, the limb broad, spreading, slightly bilabiate, the lobes often toothed or fimbriate; filaments short-connate at the base, the anthers narrowly oblong, large, usually free, sagittate at the base, only partially dehiscent; disk gland solitary, posterior.

Calyx lobes obtuse or rounded.
  Ovary red-villous; stems and leaves hirsute. Corolla red, long-pilose; leaves green beneath .... *D. alloplectoides.*
  Ovary glabrous; stems and leaves strigillose or glabrous.
    Corolla white, minutely puberulous; leaves purple beneath, minutely strigillose, crenulate.
      Filaments contorted .... *D. marmorata.*
      Filaments straight .... *D. turrialvae.*
    Corolla pink, glabrous; leaves green beneath, glabrous, entire. *D. conchocalyx.*
Calyx lobes acute or acuminate.
  Plants epiphytic vines. Calyx lobes usually serrulate.
    Leaves and calyces puberulous. Corolla yellowish white. *D. mollis.*
    Leaves and calyces strigillose.

Leaf blades broadly ovate........................*D. ovata.*

Leaf blades oblong..........................*D. spectabilis.*

Plants erect, terrestrial shrubs (epiphytic in *D. parviflora*).

Calyx lobes sharply toothed or pectinate.

Corolla yellow, 2.8 cm. long or less............*D. parviflora.*

Corolla white, veined with red, about 4 cm. long. .*D. fimbriata.*

Calyx lobes entire.

Corolla pure white, the lobes long-fimbriate; calyx densely puberulous..............................*D. lanceolata.*

Corolla not pure white, the lobes erose or dentate; calyx glabrous or slightly strigillose.

Pedicels longer than the calyx; corolla 4.5–6 cm. long, the limb about 4 cm. wide.......................*D. rubra.*

Pedicels shorter than the calyx; corolla 2.5–3 cm. long, the limb 2 cm. wide or less...........*D. Warszewicziana.*

Drymonia alloplectoides Hanst. Linnaea 34: 358. 1865–66. Costa Rica, without definite locality, *Warscewicz 34.* Low elevations on the Atlantic coast. Nicaragua. A subscandent, epiphytic shrub, 0.6–1.2 meters high, the stems brown-hirsute; leaves subequal, short-petiolate (0.5–1.5 cm.), the blades ovate to oblong, up to 10 cm. long and 5 cm. wide, acute, rounded at the base, serrulate or serrate, hirsute on both sides; flowers solitary, the pedicel up to 1.8 cm. long, densely hirsute; calyx lobes red, connate at the base, strongly unequal, the 2 anterior ones broadly elliptic, 2.5–2.8 cm. long, the 2 lateral ones about 2.3 cm. long, the posterior one suborbicular, about 0.9 cm. long, all obtuse, serrulate, hirsute on both sides, the midrib prominent, elevated; corolla red, 5–5.5 cm. long, saccate at the posterior base, horizontal in the calyx, densely pilose, the tube gradually ampliate, becoming 2 cm. wide, not contracted in the throat, the limb slightly bilabiate, 3 cm. wide, glabrous within, not spotted, the anterior lobe fimbriate; filaments flattened, connate, partially adnate to the corolla, the anthers oblong, 7 mm. long; ovary red-villous; gland posterior, glabrous; style pilosulous.

Drymonia conchocalyx Hanst. Linnaea 34: 360. 1865–66. Between Desengaño and Cariblanco, *Wendland 954.* Central mountains, 1,400–1,700 meters; region of San Ramón. Endemic. An epiphytic shrub to 1.8 meters high, the stems glabrous; leaves slightly unequal, short-petiolate (up to 2.5 cm.), the blades elliptic to oblong, up to 22 cm. long and 9 cm. wide, cuspidate, rounded and oblique at the base, entire, green, wholly glabrous; flowers solitary or in pairs, not bracteate, the pedicels red, 3–5 cm. long, glabrous; calyx red, oblique, irregular, the 2 anterior lobes oblong, about 3 cm. long, 1 cm. wide, obtuse, connate anteriorly for 1.5 cm., the lateral lobes ovate, obtuse, about 3 cm. long, 2 cm. wide, connate to the anterior lobes for 1 cm., the posterior lobe 2 cm. long, acuminate, incurved, all the lobes entire, glabrous; corolla tube whitish, spotted with lavender inside, the lobes pink, drying purple, about 7 cm. long, saccate at the base, horizontal in the calyx, glabrous, the tube slightly ampliate, not contracted in the throat, the limb about 4 cm. wide, the lobes all fimbriate; filaments flattened, glabrous, contorted, adnate toward the base to the corolla, connate in pairs; anthers oblong, 6.5 mm. long; ovary strigillose; style glabrous.

Drymonia fimbriata Morton, Journ. Wash. Acad. Sci. 27: 311. 1937. Near El General, Prov. San José, 880 meters, *Skutch 2839*. Known only from El General. A shrub 1.5 meters high, the stems quadrangular, strigillose; petioles up to 4.7 cm. long; leaf blades broadly ovate, 22 cm. long, 11 cm. wide, short-acuminate, oblique and decurrent at the base, denticulate, nearly glabrous above, sparsely strigillose beneath; flowers aggregate in the leaf axils, the pedicels strigillose, about 13 mm. long, bracteate at the base, the bracts lanceolate, 5 mm. long, entire, puberulous; calyx lobes green, oblong, free, subequal, oblique, about 15 mm. long, puberulous on both sides, pectinate-fimbriate, the teeth filiform, up to 10 mm. long, puberulous; corolla white with red stripes, about 4 cm. long, horizontal in the calyx, spurred at the base (4.5 mm.), the tube pilosulous, curved, ampliate upwardly, not contracted in the throat, the limb glabrous, oblique, bilabiate, the upper and lower lips lacerate-dentate, the lateral lobes entire; filaments glabrous; anthers oblong, connate; ovary puberulous.

Drymonia lanceolata (Hanst.) Morton, comb. nov. *Episcia lanceolata* Hanst. Linnaea 34: 346. 1865–66. Cariblanco, *Wendland 902*. Central mountains, at middle elevations. Panama. Terrestrial herbs, 1–1.2 meters high, the stems unbranched, minutely strigillose at the apex; petioles up to 6 cm. long; leaf blades elliptic or broadly elliptic, up to 20 cm. long and 9 cm. wide, short-acuminate, cuneate at the base, membranous, crenulate, sparsely strigose above, soon glabrous, puberulous beneath, the primary veins about 6 pairs; flowers axillary, solitary, the pedicels 2.4–5 cm. long, longer than the calyx; calyx lobes pale green, oblique, ovate-lanceolate, 2.2–4 cm.

long, long-acuminate, entire, densely puberulous externally, unequal, the posterior smaller, saccate at the base; corolla white, 3.6–4.5 cm. long, oblique in the calyx, short-spurred at the base, the tube curved, puberulous externally, broad, not or scarcely contracted in the throat, the limb broad, the lobes unequal, long-fimbriate; anthers oblong, sagittate, about 5 mm. long; ovary strigillose.

Drymonia marmorata Hook. f. Bot. Mag. 110: *pl. 6763.* 1884. Locality given doubtfully as Guiana, but probably Costa Rica. La Palma; Llanuras de Santa Clara; El General. A terrestrial herb with unbranched, strigillose stems; leaves long-petiolate (up to 12 cm.), the blades oblong to orbicular, up to 30 cm. long and 20 cm. broad, cuspidate, rounded or cordate at the base, crenulate, green and glabrous above, purple and minutely strigillose beneath; flowers in short, congested, bracteate racemes, the bracts purple, oblong, about 3 cm. long, sparingly strigillose, the pedicels up to 4 cm. long, glabrous; calyx lobes red-purple, ovate, about 2 cm. long, obtuse, entire, sparingly strigillose; corolla white, about 6 cm. long, saccate at the base, horizontal in the calyx, finely puberulous, the tube ampliate upwardly, not contracted in the throat, the limb bilabiate, the anterior lobe the largest, fimbriate; filaments glabrous, contorted; anthers oblong, sagittate; ovary glabrous.

Drymonia mollis Oerst. Centralamer. Gesner. 37. 1858. Ujarrás, *Oersted.* Central mountains; Atlantic coast; region of San Ramón. Endemic. An epiphytic vine, the stems densely puberulous toward the apex; leaf blades oblong, up to 12.5 cm. long and 5 cm. wide, acute, rounded or cuneate at the base, serrulate, puberulous on both sides; pedicels solitary, 1–1.5 cm. long; calyx lobes ovate, 2.5–3 cm. long, serrulate, puberulous on both sides; corolla yellowish white, scarcely longer than the calyx, horizontal in the calyx, spurred at the base, the tube villosulous, enlarged to the throat, the limb bilabiate, the lobes fimbriate.

Drymonia ovata Hanst. Linnaea 34: 355. 1865–66. Río Virilla, *Hoffmann 545.* Description adapted from the original. Stems reddish, hirto-pubescent, scandent; leaf blades broadly ovate, 7.5–10 cm. long, 3.7–6.7 cm. wide, subentire or denticulate, scabrid-pubescent; pedicel about equaling the petiole; calyx lobes broadly ovate, 2.5–3 cm. long, acute, lightly crenate-serrate, densely pubescent, unequal; corolla yellowish rose, about 3 cm. long, short-tomentulose, the limb 1.8 cm. wide, the lobes fimbriate-denticulate; anthers very long, sagittate.

Drymonia parviflora Hanst. Linnaea 34: 352. 1865–66. Candelaria, *Hoffmann 798.* Description adapted from the original. Epiphytic, the stems thick, tetragonal, branched, pubescent; leaves about 30 cm. long, 7.5–10 cm. wide, the blades elongate-elliptic, acuminate, narrowed at the base and long-decurrent into the petiole, sinuate-denticulate; flowers fasciculate, numerous in the leaf axils, the pedicels hirto-pubescent, shorter than the flowers; calyx lobes oblong-lanceolate, 12–14 mm. long, membranous, mucronate-acuminate, cristate-dentate, the teeth 5–6 on each side; corolla yellow, 2–2.8 cm. long, horizontal in the calyx, the tube curved, puberulous, ampliate in the throat, the limb spreading, 1.6–2 cm. wide, the lobes denticulate-fimbriate; ovary pilose.

Drymonia rubra Morton, sp. nov.—Frutex terrestris, 1.2–1.8 m. altus, caulibus glabris; folia paullo inaequalia, petiolata (usque ad 3.5 cm.); lamina foliorum elliptica, usque ad 13 cm. longa et 6 cm. lata, acuminata, basi cuneata, membranacea, integra, utrinque glabra; flores axillares, solitarii, longe pedicellati, pedicello glabro, usque ad 7 cm. longo, quam calyce longiore; calyx obliquus, viridis, 3.5–4 cm. longus, lobis ovatis subaequalibus, longe et acriter acuminatis, integris, utrinque glabris; corolla rubra, 4.5–6 cm. longa, in calyce obliqua, basi saccata, tubo sursum ampliato, non ventricoso, externe minute strigilloso, in fauce non contracto, limbo patente, ca. 4 cm. lato, subbilabiato, lobis crenato-dentatis; antherae oblongae, 5.5 mm. longae; ovarium strigillosum.—Yerba Buena, Prov. Heredia, alt. 2,000 meters, *Standley & Valerio 49933* (type in U. S. Nat. Herb., No. 1,306,254). Same locality, *Standley & Valerio 49188, 49245, 49670, 49733.* Cerro de Las Caricias, Prov. Heredia, alt. 2,000–2,400 meters, *Standley & Valerio 51959, 51995, 52033.* La Palma, Prov. San José, *Pittier 682B; Standley 33109.* La Carpintera, Prov. Cartago, *Standley 35511, 35630.* Viento Fresco, Prov. Alajuela, alt. 1,600–1,900 meters, *Standley & Torres 47872.* Fraijanes, Prov. Alajuela, *Standley & Torres 47674.* Los Angeles de San Ramón, *Brenes 3946.* La Palma de San Ramón, *Brenes 3737.* San Rafael de San Ramón, *Brenes 22018.* Santo Domingo de Vara Blanca, *M. Valerio 1547.* Zarcero, *A. Smith A240, A684.*

Drymonia spectabilis (HBK.) Mart. Llanuras de Santa Clara. Changuinola Valley, Panama. Reported from Mexico to Colombia. An epiphytic vine, the stems puberulous toward the apex; leaf blades oblong, up to 10 cm. long and 4.5 cm. wide, short-acuminate, cuneate at the base, serrulate, sparingly strigillose on both sides; pedicels solitary, 1–1.5 cm. long; calyx lobes ovate-lanceolate, up to 4 cm. long, entire or serrulate, acuminate, sparingly strigillose; corolla not much longer than the calyx, horizontal in the calyx, spurred at the base, minutely puberulous, ampliate toward the throat, the limb bilabiate, the anterior lobe erose-fimbriate. The identification of the Costa Rican plants with *D. spectabilis* of Colombia is doubtful.

Drymonia turrialvae Hanst. Linnaea 34: 359. 1865–66. Volcán de Turrialba, *Wendland 517.* Central mountains; Atlantic coast. Panama. Similar to *D. marmorata,* but the filaments not contorted; leaves and calyces more densely strigillose. Perhaps not specifically different.

Drymonia Warszewicziana Hanst. Linnaea 34: 352. 1865–66. Costa Rica, without special locality, *Warscewicz 17.* Low elevations, Atlantic and Pacific coasts; Guanacaste. Terrestrial shrubs, 1–2 meters high, the stems sparingly red-pilosulous at the apex; petioles 1–3.5 cm. long; leaf blades elliptic or ovate-oblong, 7.5–14 cm. long, 3–5 cm. wide, short-acuminate, cuneate at the base, subentire, glabrate above, very sparsely strigillose beneath; pedicels axillary, solitary or paired, 10–16 mm. long, shorter than the calyx; calyx lobes green, oblique, oblong-lanceolate or ovate-lanceolate, 2–2.8 cm. long, 6–10 mm. wide, long-acuminate, subentire, strigillose, unequal, the posterior shorter, saccate at the base; corolla red, pinkish, or brown and yellow, infundibuliform, 2.5–3 cm. long, horizontal in the calyx, saccate at the base, the tube curved, ampliate toward the throat, nearly glabrous, the limb spreading, crenulate, 16–20 mm. wide; anthers oblong; ovary densely short-tomentose; style glabrous.

EPISCIA Mart.

Episcia lilacina Hanst. Linnaea 34: 342. 1865–66. Río Sarapiquí, near San Miguel, in forest, *Wendland 782. E. acaulis* Donn. Smith, Bot. Gaz. 61: 378. 1916 (banks of Río de Las Vueltas, Tucurrique, Prov. Cartago, 635 meters, *Tonduz 13167*). *?E. Fendleriana* Kuntze. Low elevations, Atlantic and Pacific coasts. A prostrate, stoloniferous, subacaulescent herb, the stolons and short stems hirsute; leaves crowded, petiolate (0.8–1.5 cm.), the blades broadly elliptic, up to 5 cm. long and 3 cm. wide, obtuse, rounded at the base, crenate, bullate on the upper surface, hirsute, beneath pilose, purple; flowers solitary, axillary, the pedicels 12–16 mm. long, pilose; calyx lobes purple, oblong-spatulate, about 8 mm. long, obtuse, entire, slightly unequal, pilose on both sides; corolla about 4.5 cm. long, spurred at the base, horizontal in the calyx, sparsely pilosulous, the tube not ventricose, gradually enlarged to the throat, the limb about 3 cm. wide, bilabiate, the lobes orbicular, entire; filaments slender, glabrous; anthers oblong, 2 mm. long; disk gland emarginate; lamellae of the placentae ovuliferous on both surfaces. One or two additional species are found in Central America. The genus is here adopted as limited by Sprague (Kew Bull. 1912: 85–90).

GESNERIA L.

Gesneria tenera (Oerst.) Kuntze, Rev. Gen. 2: 473. 1891. *Chorisanthera tenera* Oerst. Centralamer. Gesner. 35. 1858. Described from Cerro de Aguacate, *Oersted.* A wholly dubious species. No specimens of *Gesneria* from Costa Rica have been seen.

GLOXINIA L'Hér.

Gloxinia perennis (L.) Fritsch. Cultivated for ornament. Native probably of Brazil. An herb with large, long-petiolate, cordate-based, glabrate leaves; flowers in an elongate, terminal, leafy-bracteate raceme; calyx lobes glabrous, large and broad; corolla pale bluish, open-campanulate, densely pilose, horizontal in the calyx, the limb regular; disk annular.

HEPPIELLA Regel

Heppiella ulmifolia (HBK.) Hanst. Reported doubtfully from Costa Rica by Fritsch (Bot. Jahrb. 50: 400. 1913). South America. Plants with the habit of *Kohleria* but with an annular disk; leaf blades bullate above, coarsely reticulate beneath; flowers clustered in the leaf axils; calyx tube short, the lobes narrow, free; corolla red, tubular, not ventricose, the limb narrow, regular; stamens not connate or connivent, the anthers oblong, the cells distinct; ovary half inferior.

HYPOCYRTA Mart.

Hypocyrta nummularia Hanst. Linnaea 34: 381. 1865–66. Costa Rica, without special locality, *Wendland 1272.* Central mountains at middle elevations; region of San Ramón. Guatemala. Creeping, epiphytic herbs, the stems reddish, red-hirsute; leaves clustered at the apices of short, lateral branches, the petiole up to 2 cm. long, the blades obovate, up to 4 cm. long and 2 cm. wide, rounded, attenuate and decurrent at the base, thin-membranous, entire, sparsely pilosulous on both sides; flowers solitary, axillary, the pedicels slender, about 2 cm. long, pilosulous; calyx lobes green, linear-lanceolate, about 8 mm. long and 1.5 mm. broad at the base, entire, membranous, pilosulous, equal, erect; corolla red, about 2 cm. long, erect in the calyx, not spurred at the base, puberulous externally, the tube about 2 mm. wide at the base, near the apex abruptly and conspicuously ventricose, becoming 1 cm. wide, strongly contracted in the throat, the limb oblique, yellow, about 3 mm. wide, the lobes small, erect; anthers connate, quadrate, the cells discrete, parallel; disk gland posterior.

KLUGIA Schlecht.

Klugia azurea Schlecht. Valley of Desengaño. Mexico. An erect herb, 30 cm. high or more, the stems slender, little branched, puberulous; leaves alternate, short-petiolate (1–2 cm.), the blades ovate, up to 15 cm. long and 8 cm. wide, sharply acuminate, rounded and oblique at the base, membranous, entire, sparingly pilosulous above, glabrate beneath; inflorescence a terminal raceme, the common peduncle short, the pedicels and bracts alternate, the bracts linear, the pedicels slender, 6–8 mm. long; calyx purple, tubular, about 1 cm. long, erect, the lobes connate most of their length, saccate at the base, glabrous; corolla blue, tubular, about 3 cm. long, erect in the calyx, not spurred or gibbous at the base, glabrous, the tube cylindric, not ventricose, the limb spreading, bilabiate, the lobes denticulate; anthers reniform, the cells divaricate, confluent at the apex; disk annular; placentae ovuliferous on both sides.

KOELLIKERIA Regel

Koellikeria argyrostigma (Hook.) Regel. Central mountains; Puntarenas; region of San Ramón. Panama to South America. A delicate herb, propagating by scaly offsets, the stems unbranched, pilose; leaves opposite, petiolate, clustered near the apex of the stem, obovate or broadly elliptic, up to 6.5 cm. long, obtuse or rounded, broadly cuneate at the base, membranous, crenate, pilose on both sides; inflorescence a terminal, elongate raceme, the pedicels and minute bracts alternate, the bracts spatulate, about 2 mm. long; calyx about 2.5 mm. long, the tube turbinate, the lobes free, lanceolate, pilosulous without, glabrous within; corolla white, purple in the throat, about 5 mm. long, erect in the calyx, not spurred, the limb bilabiate; filaments glabrous; anthers quadrate, the cells oblong, distinct; ovary half inferior, the free part pilose; style glabrous; stigma bilobed; disk annular, entire, glabrous.

KOHLERIA Regel

Herbs or shrubs, the stems and leaves usually hirsute; leaves opposite or ternate, usually subequal, thick, serrate or crenate;

flowers solitary, fasciculate, or umbellate, sometimes falsely racemose; calyx lobes thick, erect, equal, pubescent on both surfaces; corolla scarlet, erect in the calyx, tubular, usually ventricose at the middle, conspicuously red-hirsute, the limb narrow, subregular; filaments inserted in the base of the corolla, not contorted; anthers free or connate, the cells not confluent, longitudinally dehiscent; ovary over two-thirds inferior, the lamellae of the placentae ovuliferous on both surfaces; style pilosulous, thick; stigma bilobed or stomatomorphic; disk of 5 glands, or these united into an entire, very thin annulus.

Stigma stomatomorphic; disk glands united into an entire or subentire ring; calyx lobes linear-lanceolate or linear-subulate. Flowers umbellate on a common peduncle; filaments pilose at the base (*Moussonia*).
- Pubescence of stems, petioles, peduncles, and pedicels appressed. *K. strigosa.*
- Pubescence hirsute or hirsutulous.................. *K. elegans.*

Stigma bilobed; disk glands 5, free or the 2 posterior ones partially connate; calyx lobes deltoid-ovate or deltoid.
- Flowers umbellate, a common peduncle present; filaments pilosulous; 2 posterior disk glands connate (*Brachyloma*). *K. maculata.*
- Flowers solitary or fasciculate in the axils of leaves or bracts, a common peduncle absent; filaments glabrous; all disk glands free.
  - Corolla limb narrower than the tube, the lobes minute, equal, erect (*Cryptoloma*)........................ *K. tubiflora.*
  - Corolla limb broader than the tube, the lobes spreading or partly reflexed, somewhat unequal (*Eukohleria*).
    - Pubescence whitish lanate-tomentose; calyx lobes deltoid, shorter than the calyx tube, the margins plane. *K. longifolia* var. *petiolaris.*
    - Pubescence reddish, hirsute; calyx lobes triangular-ovate, longer than the calyx tube, the margins thickened, recurved.............................. *K. spicata.*

Kohleria elegans (Dcne.) Loes. *Moussonia costaricensis* Klotzsch ex Oerst. Centralamer. Gesner. 33. 1858 (Veragua, Panama, *Warscewicz*). Naranjo; Escasú. Mexico and Guatemala. A branched shrub, the stems, peduncles, and pedicels hirto-tomentose, the hairs spreading; leaf blades pilosulous beneath; flowers umbellate on a short or elongate common peduncle; calyx lobes linear-subulate; corolla tube ampliate upwardly, not ventricose, not contracted in the throat, the limb subregular, patent, the lobes crenulate; filaments pilose at the base; stigma stomatomorphic; disk glands connate into a ring.

Kohleria longifolia (Lindl.) Hanst. var. **petiolaris** (Benth.) Morton, comb. nov. *Gesneria petiolaris* Benth. Bot. Voy. Sulph. 131. 1844. Cocos Island. Originally described from "Island off the coast of Veragua," perhaps Coiba(?). An herb with unbranched, closely tomentose stems; leaves ternate, long-petiolate, elliptic, obtuse or merely acutish, densely and closely tomentose beneath; inflorescence elongate, the pedicels fasciculate in the axils of reduced floral leaves, whitish-tomentose; calyx tube and lobes appressed-whitish-tomentose, the lobes deltoid, about 2 mm. long; corolla erect, slightly ventricose, contracted in the throat, the limb spreading, a little irregular, glandular-pilose within; filaments glabrous; stigma bilobed; disk glands 5, free. Differs from the typical form of Guatemala in its smaller, obtuse or acutish, rather than acuminate leaf blades, these more densely and closely tomentose beneath.

Kohleria maculata Morton, sp. nov.—Herba alta, caulibus non ramosis, sulcatis, longe hirsutis, pilis iridescentibus flaccidis multiseptatis eglanduliferis; folia opposita aequalia, breviter petiolata, petiolo crasso, usque ad 13 mm. longo, dense longeque hirsuto; laminae foliorum ellipticae, 9 cm. longae, 4 cm. latae, acuminatae, basi rotundatae, regulariter usque ad basin crenatae, crassae, supra hirsutae, subtus molliter pilosae, venis primariis 7-jugis; inflorescentia axillaris umbellata, usque ad 7 cm. longa, pedunculo communi usque ad 2.5 cm. longo, 1.5 mm. diam., dense hirsuto, apice bibracteato, bracteis lineari-lanceolatis, sessilibus, usque ad 15 mm. longis, pedicellis 4–6, usque ad 3 cm. longis, dense rubro-hirsutis; calycis tubus late turbinatus, 4 mm. longus, rubro-hirsutus, lobis triangulari-ovatis, 6.5 mm. longis, 3.5 mm. latis, acutis integris erectis aequalibus, utrinque hirsutis; corolla coccinea tubulosa, 3 cm. longa, in calyce erecta, externe dense rubro-hirsuta, tubo basi 5.5 mm. lato, medio ventricoso et 9 mm. lato, fauce contracta, 6 mm. lata, limbo angusto, 1 cm. lato, lobis aequalibus brevibus rotundatis patulis integris, ca. 2 mm. longis, intus maculatis glabris, in fauce glandulosis; filamenta basi corollae tubi affixa, recta, glanduloso-pilosula; antherae liberae quadratae, ca. 2 mm. longae et latae, loculis oblongis; ovarium (pars libera) conicum, longe hirsutum; stylus pilosulus; stigma bifidum;

disci glandulae 5, ca. 1 mm. altae, 2 posticae connatae; placentae lamellae utrinque ovuliferae.—San José, Sept. 4, 1936, *Estrella Moraña 40* (type in Herb. Field Mus., No. 873,011).

Kohleria spicata (HBK.) Oerst. *K. Schiedeana* (DC.) Hanst. *K. Wageneri* Regel. *K. tetragona* Oerst. Centralamer. Gesner. 27. 1858 (Aguacaliente, *Oersted*). *Brachyloma strictum* Oerst. op. cit. 29 (Cerro de Aguacate, *Oersted*). *Cryptoloma strictum* Hanst. Linnaea 29: 538. 1857–58. *Isoloma strictum* Hemsl. Biol. Centr. Amer. Bot. 2: 479. 1882. *I. tetragonum* Hemsl. op. cit. 480. Tropical Atlantic region; in central mountains, ranging up to 1,500 meters. Mexico to South America. An herb with erect, unbranched, reddish-hirsute stems up to 1.5 meters high; leaves opposite or ternate, elliptic or elliptic-lanceolate, obtuse or cuneate at the base, crenate-serrate, thick but flexible, hirsutulous above, tomentose-hirsute beneath, often with red veins; flowers solitary or clustered in the leaf axils, the inflorescence often racemose by reduction of the floral leaves to bracts, the pedicels up to 2.5 cm. long, hirsute; calyx tube hirsute, the lobes green, triangular-ovate, hirsute on both sides, the margins thickened and recurved; corolla scarlet, up to 2 cm. long, erect in the calyx, red-hirsute externally, the tube ventricose, a little deflexed, the throat contracted, the limb spreading, slightly bilabiate, the lower lobes reflexed, the upper erect, not spotted within; filaments glabrous; anthers about 2 mm. long; style pilosulous; stigma bilobed; disk of 5 distinct glands.

Kohleria strigosa Morton, sp. nov.—Frutex ramosus, usque ad 1 m. altus, caulibus teretibus, dense strigosis; folia opposita, subaequalia, petiolo usque ad 2 cm. longo, strigilloso-puberulo; laminae foliorum oblique ovatae, usque ad 12 cm. longae et 5 cm. latae, acuminatae, basi rotundatae, crassae, serrulatae, supra virides pilosulae, subtus puberulae, venis primariis 7–8-jugis; inflorescentia cymosa axillaris, 10–12 cm. longa, ca. 7-flora, pedunculo communi elongato, 6–8 cm. longo, strigoso, pedicellis usque ad 15 mm. longis; calycis tubus subcylindricus, ca. 3.5 mm. longus, 2.5 mm. latus, basi attenuatus, externe dense strigilloso-puberulus, lobis erectis, lineari-lanceolatis, ca. 4 mm. longis, 1.5 mm. basi latis, integris subaequalibus, utrinque puberulis; corolla coccinea tubulosa, 20–25 mm. longa, in calyce erecta, basi paullo ampliata, externe rubro-pilosa, tubo ca. 3.5 mm. supra basin lato, non ventricoso, sursum paullo ampliato, fauce non contracta, 8–9 mm. lata, limbo ca. 15 mm. lato, lobis patulis aequalibus rotundatis apiculatis, intus glabris et eglanduliferis; filamenta basi corollae tubi affixa, basi pilosa; antherae liberae subquadratae, ca. 1.3 mm. longae, 1 mm. latae, loculis oblongis; ovarium (pars libera) conicum hirsutum; stylus pilosulus eglandulosus; stigma stomatomorphum; disci glandulae omnino in annulum integrum tenerum conjunctae; placentae lamellae utrinque ovuliferae. —Tapesco de Zarcero, Alajuela, 2,000 meters, *Austin Smith H428* (type in Herb. Field Mus., No. 919,559).

Kohleria tubiflora (Cav.) Hanst. *Cryptoloma Hookerianum* Hanst.; *Gesneria picta* Hook.; *?C. rhynchocarpa* Benth. *Brachyloma pilosum* Oerst. Centralamer. Gesner. 29. 1858 (Cerro de Aguacate, *Oersted*). *Cryptoloma pilosum* Hanst. Linnaea 29: 538. 1857–58. *?C. cordifolium* Hanst. Linnaea 29: 538. 1857–58 (without definite locality, *Hoffmann*). *Isoloma cordifolium* Hemsl. Biol. Centr. Amer. Bot. 2: 478. 1882. *I. pilosum* Hemsl. op. cit. 479. Poás; Aguacate; region of San Ramón. Panama. An herb with unbranched, hirsute stems up to 1 meter high; leaves opposite, short-petiolate, the blades obliquely elliptic, coarsely crenate-serrate, pilosulous on both sides; flowers axillary, solitary or rarely in 2's or 3's, the floral leaves usually not reduced, the pedicels up to 1.5 cm. long, densely hirsute; calyx tube hemispheric, hirsute, the lobes equal, erect, triangular-ovate, hirsute on both sides, the margins not recurved; corolla scarlet, yellowish in the throat, 2–2.5 cm. long, erect in the calyx, red-hirsute, the tube ventricose upwardly, not deflexed, gradually contracted to the throat, the limb very narrow, the lobes small, equal, erect, about 1.5 mm. long, glabrous and eglandular within; filaments glabrous; anthers 2.5 mm. long, 2 mm. wide, the cells oblong; style pilosulous; stigma bilobed; disk glands 5, the 2 posterior ones approximate, free.

MONOPYLE Moritz

Perennial herbs with sparingly branched, reddish stems; leaves of a pair connected by a stipular line, very unequal, the smaller often stipuliform, serrate, thin-membranous; inflorescence paniculate, terminal, several–many-flowered, the flowers pedicellate; calyx lobes 5, entire, equal; corolla white and purple, open-campanulate, not spurred at the base, minutely strigillose-pilosulous externally, the limb broad, with spreading, subequal lobes; stamens 4, with a rudimentary fifth, the filaments inserted on the base of the corolla tube, incurved upwardly, the anthers connate, 2-celled, the cells a little divergent; ovary almost wholly inferior, the lamellae of the placentae ovuliferous on both sides; style short and thick, glabrous; stigma stomatomorphic, pilose; disk none; fruit capsular, linear-oblong, opening by 2 longitudinal slits.—The two species below described are the only ones known from North America.

Calyx lobes oblong, red-purple, recurved at the tip; inflorescence (especially calyx tube) with numerous dark, reddish brown, uncinate, glandular hairs; petioles over 1 cm. long, bearing long, brown, flaccid, multiseptate hairs; lower leaf surface glabrous; corolla oblique in the calyx........................ *M. Maxonii.*

Calyx lobes linear-oblong, green, not recurved; inflorescence with hyaline, eglandular, uncinate hairs; petioles commonly not over 5 mm. long, closely puberulous, lacking long, brown hairs; lower leaf surface minutely strigillose; corolla erect in the calyx. *M. puberula.*

Monopyle Maxonii Morton, sp. nov.—Herba perennis 30–100 cm. alta, caulibus non vel parum ramosis, subflexuosis rubescentibus, parce pilosis, pilis longis brunneis multiseptatis, demum deciduis; folia opposita valde inaequalia, majora longe petiolata, petiolo 1–3.5 cm. longo, parce brunneo-piloso; laminae foliorum majorum oblongae, usque ad 19 cm. longae et 6.5 cm. latae, acuminatae, basi obliquae et obtusae, tenuiter membranaceae, serratae, vix ciliatae, supra virides, parce pilosulae, subtus saepe rubescentes, venis sparse pilosulae, mesophyllo glabro, venis primariis 7–12-jugis; folia minora breviter petiolata, reducta, saepe 1–2 cm. longa; inflorescentia terminalis, laxe paniculata, 10–21 cm. longa, pedunculo communi 5–9 cm. longo, rubro, minute glanduloso-pilosulo, pilis basi hyalinis, sursum glandulosis cylindricis gracilibus atrorubris apice uncinatis; bracteae saepe parvae, late lineares, raro foliosae et usque ad 3.5 cm. longae; inflorescentiae rami primarii 1–4-jugi, 3–35 mm. longi, apice bibracteolati, simplices vel pluries furcati, pedicellis 2–4, terminalibus subumbellatis, inaequalibus, 8–30 mm. longis; calycis tubus cylindricus, ad anthesin ca. 5 mm. longus et 2.2 mm. latus, basi attenuata gibbosus et curvatus, ubique pilis minutis rubris glanduliformibus uncinatis vestitus; calycis lobi rubropurpurei, oblongi, ca. 5 mm. longi, 2.5 mm. lati, integri eciliati, externe puberuli, intus glabri, apice recurvati; corolla basi alba, sursum violacea, apice brunneopurpurea, (1.5) 2–3 cm. longa, late campanulata, in calyce obliqua, basi ecalcarata, non gibbosa, externe parce appresso-pilosula, tubo basi ca. 4 mm. lato, abrupte ampliato, in fauce usque ad 2 cm. lato, limbo 2–3 cm. lato, lobis patentibus rotundatis subaequalibus, ca. 8 mm. longis, integris eciliatis, intus glabris et eglanduliferis; filamenta basi corollae affixa, glabra, antheris connatis, loculis discretis,

subdivergentibus, rimis brevibus longitudinalibus dehiscentibus; ovarium fere omnino inferum, pars libera conica brevis pilosula; stylus crassus glaber; stigma stomatomorphum longe pilosum; discus nullus; fructus capsularis, rimis 2 longtitudinalibus dehiscens, elongato-cylindricus, 16–19 mm. longus, 2.5 mm. latus; calycis lobi persistentes, indurati; placentae lamellae utrinque ovuliferae.—La Palma, Prov. San José, 1,500–1,700 meters, July 17–18, 1923, *Maxon & Harvey 7947* (type in U. S. Nat. Herb., No. 1,181,611). Same locality, *Tonduz 7457* (Herb. Nac. C. R. *12491, 12441*); *Pittier 10179; M. Valerio 1426 p.p.* Desamparados, *Pittier 1158.* Yerba Buena, Prov. Heredia, *Standley & Valerio 49701, 49759.* Los Angeles de San Ramón, Prov. Alajuela, *Brenes 4916, 6106.* It is likely that this is the plant described as *M. macrocarpa* var. *costaricana* Hemsl. (Biol. Centr. Amer. Bot. 2: 472. 1882; at 1,200 meters, *Endres 82*), but the brief description of Hemsley ("foliis minoribus concoloribus, calycis lobis brevioribus latioribus") does not adequately characterize it. The typical *Monopyle macrocarpa* Benth., a native of Amazonian Peru, is evidently a quite different plant with linear calyx lobes, eglandular inflorescence, and leaves soft-pubescent beneath. The present species has been identified as *M. paniculata* Benth., which, as represented by a specimen of the type collection in the New York Botanical Garden, differs in its biserrate leaves, strigillose on the mesophyll beneath, in its eglandular inflorescence, and in its linear calyx lobes, not recurved at the apex.

Monopyle puberula Morton, sp. nov.—Herba perennis, 60–80 cm. alta, caulibus rubescentibus, ramosis, parce pilosulis, pilis brevibus, albis, uncinatis; folia opposita, valde inaequalia, majora breviter petiolata, petiolo saepe ca. 5 mm. longo, dense puberulo, pilis minutis, albis, uncinatis, numquam longis, brunneis, multiseptatis; laminae foliorum majorum oblongae, usque ad 13.5 cm. longae et 5.5 cm. latae, acuminatae, basi obtusae et obliquae, usque ad basin regulariter serratae, tenuiter membranaceae, supra virides, subtus saepe rubescentes, supra pilosulae, subtus in venis puberulae, in mesophyllo minute strigillosae; folia minora saepe stipuliformia, subsessilia; inflorescentia terminalis, paniculata, interdum foliosa, 5–15 cm. longa, pedunculo communi 2–4.5 cm. longo, minute pilosulo, eglandulifero, bracteis saepe parvis, raro foliosis; rami primarii inflorescentiae 1–3-jugi, ca. 6 mm. longi, numquam furcati, apice bibracteolati, pedicellis 2 vel 3, subumbellatis inaequalibus, 6–15 mm. longis; calycis tubus cylindricus, ad anthesin 4.5 mm. longus, 2 mm. latus, basi attenuatus, vix curvatus vel gibbosus, externe dense pilosulus, pilis hyalinis eglandulosis uncinatis; calycis lobi lineari-oblongi, 6.5 mm. longi, 2 mm. lati, integri virides acuminati eciliati, externe breviter pilosuli, intus glabri, apice non recurvati; corolla basi alba, sursum violacea, late campanulata, 2–2.8 cm. longa, in calyce erecta, externe appresso-pilosula, tubo basi angusto, abrupte ampliato, in fauce usque ad 2 cm. lato, limbo ca. 2.8 cm. lato, lobis magnis subaequalibus rotundatis patentibus integris eciliatis, intus glabris eglanduliferis; filamenta basi corollae affixa, glabra, antheris connatis, ca. 1 mm. longis et 1.5 mm. latis, loculis suborbicularibus, rimis longitudinalibus dehiscentibus; ovarium fere omnino inferum, pars libera brevis conica pilosula; stylus crassus glaber; stigma stomatomorphum, pilosum; discus nullus.—La Palma, Prov. San José, 1,500–1,700 meters, July 17–18, 1923, *Maxon & Harvey 7990* (type in U. S. Nat. Herb., No. 1,181,652). Same locality, *M. Valerio 1426 p.p.* La Hondura, Prov. San José, *Standley 36161, 37591, 37765; M. Valerio 699.* Cerro de Las Caricias, Prov. Heredia, *Standley & Valerio 51898.* Carillo, *Pittier 1203.* La Balsa de San Ramón, Prov. Alajuela, *Brenes 4419.* El Muñeco, Prov. Cartago, *Stork 2683.* El Silencio, *J. Valerio 136.* Without locality, *Stork 2836.* —Chicoy, Alta Verapaz, Guatemala, *Tuerckheim 7929.* Quebrada Seca, Alta Verapaz, *Johnson 268.*

NAPEANTHUS Gardn.

Napeanthus apodemus Donn. Smith, Bot. Gaz. 20: 6. 1895. Shaded banks of Río Jiménez, Llanuras de Santa Clara, 200 meters, *J. D. Smith 5109.* Low elevations, provinces of Limón and Guanacaste. Low, acaulescent herbs; leaves rosulate, sessile, the blades oblong-spatulate, up to 10 cm. long and 3 cm. wide, rounded or obtuse, narrowed toward the base, membranous, entire, glabrous; inflorescence racemose-paniculate, the common peduncle up to 4 cm. long, slender, terete, glabrate, the branching dichotomous, the bracts opposite, linear; pedicels 8–16 mm. long; calyx lobes lanceolate, about 5 mm. long, acuminate, entire, erect, equal, nerved, puberulous, nearly free; corolla white, about as long as the calyx, rotate, the tube very short; stamens 4, the fifth one rudimentary, the filaments not connate, glabrous, about 1.5 mm. long, the anthers ovate, about 1.5 mm. long, glabrous, the cells discrete, diverging; disk none; fruit capsular, 2-valved. No other species occur in Central America.

PHINAEA Benth.

Phinaea lacerata Morton. Region of San Ramón. Panama. A delicate herb 9–20 cm. high, reproducing by scaly offsets, the

stems red, unbranched, substrigose; leaves clustered near the apex of the stem, opposite, petiolate, the blades elliptic, up to 8 cm. long and 4 cm. wide, coarsely biserrate or incised, strigillose beneath; common peduncle none, the pedicels solitary, axillary, filiform, puberulous; calyx about 3.5 mm. long, the tube very short, the lobes lanceolate, free, acuminate, entire, pilosulous on both sides; corolla white, unspotted, rotate, 11–15 mm. wide, actinomorphic or nearly so, the tube 2 mm. long, the lobes rounded; filaments slender, glabrous, the anterior curved; anthers much shorter than the filaments, the cells distinct, dehiscent by a short slit; disk none; ovary half inferior, the free part glabrous, globose; style glabrous, curved.

SOLENOPHORA Benth.

Solenophora calycosa Donn. Smith, Bot. Gaz. 25: 152. 1898. Slopes of Volcán de Barba, 2,300 meters, *Pittier 283*. Common in the central mountains, 1,800–2,500 meters. Endemic. A shrub, up to 4.5 meters high, branched at the base; leaves opposite, long-petiolate, the blades ovate, up to 22 cm. long and 12 cm. wide, rounded and oblique at the base, doubly serrate, membranous, pilosulous above, scabrous beneath on the veins; inflorescence axillary, one–several-flowered, the common peduncle short, bibracteolate at the apex; calyx cylindric, 3 cm. long or more, the tube extended far beyond the ovary, hirtous-pilose on both sides, the lobes deltoid, not over 5 mm. long, glandular-serrate; corolla tubular, 7–9 cm. long, scarlet-orange outside, yellow within, red-spotted on the lobes, erect in the calyx, not spurred, pilose externally, glabrous within; anther cells slightly divaricate, not confluent, oblong, about 3.5 mm. long; ovary entirely inferior, the lamellae of the placentae ovuliferous on both surfaces; style pilosulous; stigma stomatomorphic; disk glands thick, 2, posterior, connate, hirsutulous, about 3.5 mm. long. This is probably the plant reported from Desengaño as *S. insignis* (Mart. & Gal.) Hanst. by Hemsley.

Solenophora sp. A specimen collected at La Hondura by C. Wercklé (*Herb. Nac. Cost. 11570*) was reported by Donnell Smith as *S. coccinea* Benth. It doubtless represents an undescribed species, differing from *S. calycosa* in its smaller corollas, smaller, nearly glabrous calyces, and in having the leaf blades entirely glabrous beneath. The material is inadequate for a proper diagnosis.

TUSSACIA Reichenb.

Tussacia Friedrichsthaliana Hanst. Puntarenas. Changuinola Valley, Panama. Guatemala. An erect, terrestrial herb, 30–

40 cm. high, the stems puberulent; leaves of a pair equal, short-petiolate, the blades elliptic or broadly elliptic, up to 30 cm. long and 13 cm. wide, acuminate, decurrent into the petiole at the base, membranous, dentate, pilosulous above, puberulent beneath, especially on the veins; flowers umbellate, the common peduncles solitary, axillary, up to 3 cm. long, puberulous, the pedicels numerous, erect, puberulous, about 2 cm. long; calyx open-campanulate, pentagonal, yellow, about 15 mm. long, 7–8 mm. wide, the lobes united for most of their length, puberulous; corolla yellow, tubular, about 2.5 cm. long, erect in the calyx, not spurred or gibbous at the base, the tube cylindric, glabrous, not ventricose, the limb spreading, subbilabiate; anthers free, the cells parallel, discrete, dehiscent throughout; disk gland posterior, bilobed.

LENTIBULARIACEAE. Bladderwort Family

Herbs, growing in water or on wet soil, rarely epiphytic; leaves various, often submersed and finely dissected, often bearing small bladders, sometimes aerial and entire; scapes 1–many-flowered, naked or bracteate; flowers perfect, very irregular; calyx 2–5-lobate, often almost to the base; corolla bilabiate, the tube saccate or calcarate; stamens 2, adnate to the base of the corolla tube, the filaments compressed, twisted, the anthers 1-celled; ovary 1-celled, with a free, central placenta, the ovules usually numerous; fruit capsular, bivalvate or irregularly dehiscent.—One other genus, *Pinguicula,* is represented elsewhere in Central America.

UTRICULARIA L. Bladderwort

With the characters of the family, the scapes being bracteate and 1–many-flowered, the calyx bilobate. In *Pinguicula* the scape is ebracteate, always 1-flowered, and the calyx is 5-lobate.—Numerous other species are known from northern Central America, and one or two others may be expected in Costa Rica.

Utricularia Endresii Reichenb. f. Gard. Chron. 582. 1874. Type collected by Endres, at an elevation of 600 meters (Endres material seen, in Herb. Field Mus.). Frequent in mountains of the central region, at 600–2,400 meters; growing among mosses on tree trunks. Endemic. Plants large for the genus, sometimes 35 cm. high or even taller; basal leaves long-petiolate, lanceolate to lance-elliptic or oblanceolate, the blades mostly 5–7 cm. long, subobtuse to attenuate, long-attenuate to the petiole; scapes slender, mostly 2–5-flowered, bearing a few inconspicuous, subulate bracts; flowers long-pedicellate, the bract at the base 3-parted; calyx lobes ovate, 2–3 cm.

long; corolla as much as 4.5 cm. long, bright purple. The bracts are purplish green. The roots bear small, white, translucent tubers. The plant often is taken to be an orchid, because of its epiphytic habit and its large and showy, very handsome, orchid-like flowers.

Utricularia mixta Barnhart. Ochomogo, 1,500 meters. Cuba; Panama to northern South America. Plants floating on quiet water, mostly immersed, with elongate branches; leaves much dissected into threadlike segments, bearing numerous small bladders; scapes erect, usually 10–20 cm. tall, with 20 or fewer pedicellate flowers; bracts entire, not peltate, small; calyx 4–5 mm. long; corolla yellow, 15–20 mm. broad.

Utricularia obtusa Swartz. Collected in the regions of Cartago and San Ramón. Widely distributed in tropical America. Plants floating on quiet water and more or less submersed, the branches short or elongate; leaves dissected into capillary segments, bearing few minute bladders; scapes 1–6-flowered, very slender, usually less than 10 cm. tall; bracts entire, attached by the base; pedicels long and slender; calyx scarcely 2 mm. long; corolla yellow, 8–12 mm. long.

Utricularia pusilla Vahl. Collected in the region of Turrialba and in Guanacaste, and doubtless widely distributed in the tierra caliente. Widely distributed in tropical America. Plants growing in wet soil, with short, rootlike branches at the base, but these soon disappearing; scapes filiform, wiry, mostly 2–10 cm. high; bracts minute, peltate, entire, present at the base of each pedicel and 1 also between each 2 pedicels; flowers slender-pedicellate; calyx scarcely 2 mm. long; corolla yellow, 4–6 mm. long.

Utricularia verapazensis Morong. Frequent in mountains of the central region, descending to the upper part of the Atlantic tierra caliente; region of San Ramón; at 900–2,400 meters, growing among mosses on tree trunks. Guatemala. Plants similar in appearance and structure to *U. Endresii*, but smaller in all parts; basal leaves linear-oblanceolate or oblanceolate, the blades mostly 1 cm. long or less, sometimes larger, long-petiolate, obtuse or acute; scapes usually 5–12 cm. high, mostly 1–3-flowered; calyx about 1 cm. long; corolla about 1 cm. long, pale greenish purple.

ACANTHACEAE. Acanthus Family[1]

By E. C. Leonard

Herbs, shrubs, or small trees; leaves simple, opposite, exstipulate; flowers irregular to nearly regular, perfect; calyx persistent, inferior,

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the segments 5 or occasionally fewer; corolla gamopetalous, the limb 5-lobed or 2-lipped (rarely 1-lipped); stamens 4, didynamous, or 2 only; staminodes often present in 2-stamened flowers; anther sacs 2 or 1, longitudinally dehiscent; ovary 2-celled, the ovules 2–10 in each cavity; style filiform, simple; stigmas 1 or 2; fruit a capsule (drupaceous in *Mendoncia*), 2-celled, 2-valved; seeds usually flat, borne on retinacula (papilliform in a few genera, but usually hook-shaped), the testa smooth or roughened, often mucilaginous when moistened.

Corollas 1-lipped .... *Acanthus.*
Corollas 2-lipped or regular.
  Fruit drupaceous; vines .... *Mendoncia.*
  Fruit capsular; herbs, shrubs, small trees, or sometimes vines (*Thunbergia*).
    Seeds borne on papilliform retinacula.
      Peduncles with imbricate, coriaceous bracts ..... *Elytraria.*
      Peduncles, if present, without imbricate, coriaceous bracts.
        Capsules strongly beaked, 2–4-seeded; seeds relatively large; plants often scandent .... *Thunbergia.*
        Capsules not beaked, many-seeded; seeds minute; diffuse, villous herbs .... *Nelsonia.*
    Seeds borne on hooklike retinacula.
      Calyx spathaceous, 2-lobed .... *Spathacanthus.*
      Calyx deeply 3–5-parted.
        Calyx segments 3 .... *Louteridium.*
        Calyx segments 4 or 5.
          A. Stamens 4.
            Anthers 1-celled .... *Aphelandra.*
            Anthers 2-celled or the anterior pair 1-celled.
              Anterior stamens with 1-celled anthers. *Chamaeranthemum.*
              Anterior stamens with 2-celled anthers.
                Calyx segments very dissimilar, the posterior and anterior ones much larger than the lateral, the anterior ones more or less united.
                  Corolla 2-lipped, 5 mm. long, white or violet. *Lepidagathis.*

Corolla subregular, 5 cm. long or more, yellow (bluish purple when dry) .... *Barleria.*

Calyx segments similar or nearly so.

Shrubs or small trees.

Anther lobes calcarate at the base. .*Bravaisia.*

Anther lobes rounded at the base. *Trichanthera.*

Herbs (sometimes becoming suffrutescent).

Corollas 2-lipped; flowers solitary or fascicled, axillary .... *Hygrophila.*

Corollas regular or nearly so; inflorescence various.

Flowers in dense spikes; bracts closely imbricate .... *Blechum.*

Flowers borne in loose, terminal or axillary cymes or panicles (rarely in terminal heads); bracts small, not imbricate.

Anther sacs mucronate or aristulate at the base .... *Dyschoriste.*

Anther sacs muticous at the base. *Ruellia.*

A. Stamens 2.

B. Anthers 1-celled.

Stamens included.

Calyx segments 4 .... *Hansteinia.*

Calyx segments 5 .... *Buceragenia.*

Stamens exserted.

Corollas blue, the lower lip elongate, ligulate. *Habracanthus.*

Corollas red or yellow, the lower lip scarcely distinct from the tube.

Corolla tube gradually enlarged from base to mouth .... *Razisea.*

Corolla tube abruptly enlarged above the ovary. *Glockeria.*

B. Anthers 2-celled.

Calyx segments widely dissimilar .... *Barleria.*

Calyx segments similar or nearly so.

Outer bracts large, conspicuously 4-ranked; flowers borne in dense spikes..........*Tetramerium.*

Outer bracts usually small, if large, not conspicuously 4-ranked; flowers variously arranged.

C. Staminodes present.

Leaf blades mottled; cultivated plants. *Graptophyllum.*

Leaf blades green; wild plants.

Bracts imbricate, reticulate-nerved. *Eranthemum.*

Bracts not imbricate, green.

Corolla limb 2-lipped.......*Odontonema.*

Corolla limb equally or subequally 5-lobed.

Pollen marked with straight, longitudinal grooves ("Spangenpollen"). *Pseuderanthemum.*

Pollen marked with replum-shaped grooves ("Rahmenpollen"). *Chamaeranthemum.*

C. Staminodes none.

Stems conspicuously 6-angled; calyx subtended by 2 partially united bracts; placenta separating from the mature capsules...................*Dicliptera.*

Stems terete or subquadrangular; bracts distinct; placenta remaining attached to the capsule walls at maturity.

Anther cells parallel, equal, both inserted at the same height upon the filament. *Carlowrightia.*

Anther cells unequal, inserted at different heights.

Inflorescence headlike, the bracts white-hirsute, linear-subulate. *Chaetochlamys.*

Inflorescence racemose, paniculate, or spicate, rarely headlike but the bracts then broad and obtuse and not hirsute.

Anther cells muticous at the base, or the lower cell occasionally acute or subcalcarate........*Jacobinia.*

Anther cells mucronate or calcarate at the base.

Corolla short, the tube ampliate at the throat............*Justicia.*

Corolla elongate, not or scarcely ampliate.

Pollen grains marked by longitudinal grooves ("Spangenpollen")......*Streblacanthus.*

Pollen marked by knobs, pores, or plates.

Pollen bearing small knobs ("Knötchenpollen"). *Beloperone.*

Pollen marked by pores and angular plates ("Facettierter pollen").*Poikilacanthus.*

ACANTHUS [Tourn.] L.

Mostly large, herbaceous perennials with broad, pinnatifid leaves; flowers borne in spikes, sessile, solitary in the axils of the bracts; corollas white, rose, or purplish, 1-lipped, the lip 3-lobed; anthers 1-celled, ciliate.—A genus of about 20 species, found in the temperate and subtropical regions of the Old World, mostly in southern Europe.

Acanthus mollis L. Cultivated in gardens for ornament. Native of the Old World. Leaves petioled, mostly radical, the blades cordate, up to 60 cm. long and 30 cm. wide, sinuately pinnatifid and toothed, sparingly pilose; flowers borne in large, terminal spikes; bracts ovate, about 3 cm. long and 1.5 cm. wide, acuminate, puberulent, each margin with 3 or 4 slender, spreading, spine-tipped teeth up to 5 mm. long; bractlets linear, 15–17 mm. long, 1.5 mm. wide, spine-tipped, puberulent; corolla rose-white, the lip 4 cm. long; filaments 15–18 mm. long, indurate, sigmoid, glabrous.

APHELANDRA R. Br.

Shrubs or large herbs; leaf blades usually large, oblong or elliptic, usually entire; flowers red, yellow, or white, borne in large, terminal, bracted spikes; calyx 5-parted, the segments narrow, subequal or the posterior one larger; corolla tube straight or incurved, sometimes ampliate upwardly, the limb usually bilabiate, the upper lip erect, entire or 2-lobed, the lower reflexed-spreading, 3-lobed; stamens 4; anthers 1-celled; ovules 2 in each cell.

Bracts toothed.

  Bracts with a number of small, round, sessile, submarginal glands.

    Bracts 15 mm. long or less, their teeth 1 mm. long or more. *A. Deppeana.*

    Bracts 25 mm. long or more, their teeth about 0.25 mm. long. *A. Storkii.*

  Bracts without glands.

    Bracts hirsute or villous, the hairs up to 1 mm. long.

      Herbs.

        Bracts 5–7 mm. wide, bearing 2 or 3 pairs of teeth. *A. Seibertii.*

        Bracts 1.5 mm. wide, bearing a single pair of teeth. *A. Tonduzii.*

      Shrubs.................................*A. tridentata.*

    Bracts puberulent.

      Leaf blades oblong to elliptic...............*A. aurantiaca.*

      Leaf blades narrowly lanceolate...............*A. repanda.*

Bracts entire.

  Bracts essentially glabrous.

    Bracts obtuse.................................*A. micans.*

    Bracts acuminate..........................*A. dolichantha.*

  Bracts manifestly pubescent or puberulent.

    Bracts glandular-pilose, the surface without glands. *A. gigantiflora.*

    Bracts puberulent, with a number of small, round, sessile, submarginal glands.

      Bracts acute or obtusish.......................*A. tetragona.*

      Bracts, at least the upper, obtuse or rounded. *A. Sinclairiana.*

Aphelandra aurantiaca (Scheidw.) Lindl. *Pavoncillo. A. acutifolia* Nees. Wet forests. Southern Mexico to northern South

America. Herbaceous or suffrutescent, up to 1 meter high; leaves oblong to elliptic, 8–20 cm. long, 2.5–12 cm. wide, acute or acuminate, narrowed at the base, entire, glabrous or nearly so; spikes solitary, terminal; bracts ovate-lanceolate, green or red, puberulent, up to 3 cm. long and 1 cm. wide, acuminate, pectinate-toothed; bractlets and calyx segments lanceolate, puberulent and ciliolate; corolla red-orange or scarlet, puberulent, about 6 cm. long, the upper lip erect, acute, entire, the lower lip 3-lobed, the lateral lobes about one-half as long as the middle one; capsule 1.5 cm. long, puberulent.

Aphelandra Deppeana Schlecht. & Cham. *A. cristata* HBK.; *A. pectinata* Willd.; *A. Haenkeana* Nees. Woods or open places. Southern Mexico to northern South America and West Indies. Shrubs 1–4 meters high; stems pubescent; leaf blades ovate-elliptic to lance-oblong, 5–20 cm. long, 2–10 cm. wide, acuminate, narrowed at the base and decurrent on the petioles, entire or undulate, scabrous above, sparingly or densely and softly pubescent beneath; spikes terminal, one or several; bracts lance-ovate, 8–15 mm. long, 4–6 mm. wide, acuminate, pilosulous, the upper portion bearing one to several slender teeth 1 mm. long or more, with a number of small, round, sessile, submarginal glands; flowers pale to dark red or crimson, pubescent, the upper lip erect, 2-lobed, the lower lip spreading, subentire or, if 3-lobed, the lateral lobes very small; capsules 15 mm. long, obtuse, glabrous, 4-seeded.

Aphelandra dolichantha Donn. Smith, Bot. Gaz. 27: 438. 1899. Suerre, Llanuras de Santa Clara, 300 meters, *J. D. Smith 6689*. Wet forests of Costa Rica, Panama, and Colombia. Suffrutescent, up to 1.2 meters high, the tips of the stems pubescent; leaf blades elliptic, up to 22 cm. long and 12 cm. wide, short-acuminate (the tip blunt), narrowed at the base and decurrent on the petioles, entire, sparingly pubescent, the hairs confined chiefly to the costa and lateral veins beneath; spikes terminal or lateral, solitary or several in a cluster, up to 12 cm. long, 1.5 cm. in diameter, the bracts closely imbricate but spreading with age, the rachis stout, winged, sparingly pubescent; bracts ovate-lanceolate, 2.5–4 cm. long, 1–1.3 cm. wide, acuminate, nerved, glabrous or the margins puberulous; bractlets subulate, about 6 mm. long; calyx segments subulate, 2–3 mm. long; corolla white, the tube 5–6 cm. long, 1 mm. in diameter at the base, about 3 mm. at the throat, glandular-pubescent without, the upper lip oblong, 13 mm. long, 2-lobed at the tip, the lower lip 3-lobed, the middle lobe oblong-elliptic, 18–20 mm. long, 6–7 mm. wide, the lateral lobes linear, 15–17 mm. long, 4–5 mm. wide; capsules slender-clavate, about 15 mm. long, 3 mm. broad, minutely punctate; seeds flat, light brown.

Aphelandra gigantiflora Lindau. *A. Padillana* Standl. Moist woods, often on banks of streams. Guatemala, Costa Rica, and Salvador. Shrubs, up to 2.5 meters high, the stems glabrous or puberulent; leaf blades oblong-ovate, 15–25 cm. long, 4–9 cm. wide, more or less abruptly acuminate, narrowed or rounded at the base and decurrent on the petiole, thin, bright green above, paler and with a few scattered, short hairs beneath; spikes stout, terminal and axillary, 12–30 cm. long, the rachis densely glandular-pilose, the upper bracts closely imbricate, the lower loosely so, spreading, the lowermost sterile, all broadly ovate, 2–3 cm. long, obtuse or rounded at the apex or the upper acutish, entire, green or purplish, densely glandular-pilose; bractlets linear-subulate, equaling the calyx, glandular-pilose; calyx segments linear-lanceolate, 15 mm. long, long-attenuate, delicately striate-nerved, finely glandular-pilose; corolla bright red, 6.5–7.5 cm. long, finely glandular-pilose, the tube 4–5 cm. long, 7–9 mm. in diameter at the throat, the posterior lip oblong, 2.5–3 cm. long, 10 mm. wide at the base, obtuse or rounded, the lower lip 3-parted, the middle segment obovate, 2.5–4 cm. long, 15–17 mm. wide, the lateral segments oblong, 15 mm. long, 5 mm. wide, acute, sometimes unequally 2-lobed at the apex; capsules 2 cm. long, oblong-elliptic, acutish, finely puberulent.

Aphelandra micans Moritz. Guatemala, Costa Rica, Panama, and Venezuela. Shrubs, up to 2 meters high, the stems strigose; leaf blades oblong-ovate to oblong-elliptic, up to 35 cm. long and 15 cm. wide, acuminate to obtuse, narrowed at the base, thin, entire, sparingly appressed-pilosulous; petioles up to 4 cm. long; spikes terminal, solitary or several in a cluster, rigid, up to 25 cm. long, 1–2 cm. in diameter, the rachis glabrous; bracts closely imbricate, about 12 mm. long and 10 mm. wide, firm, ovate, obtuse, glabrous, or minutely ciliolate toward the tip, rather strongly nerved, bearing dorsally a pair of oval, glandular-alveolate spots about 3 mm. long and 1.5 mm. wide; bractlets linear, 12 mm. long and 2 mm. wide, carinate, striate, the keel tomentose; calyx segments oblong, 17–18 mm. long, 3–5 mm. wide, coriaceous, glabrous, striate; corolla orange-yellow, about 5 cm. long, the posterior lip erect, about 15 mm. long, arching and acuminate at the tip, the lower lip 3-lobed, spreading, the middle lobe ovate, 2 cm. long and about 9 mm. wide, acuminate, the lateral lobes about 5 mm. long, rounded, their upper edge adnate to the upper lip; capsule about 2 cm. long, glabrous, minutely punctate; seeds flat, brown, about 5 mm. long and 4 mm. wide, glabrous.

Aphelandra repanda Nees. *A. aurantiaca* var. *stenophylla* Standl. Wet forests. Central America to Peru. Suffrutescent, about 1 meter high; leaf blades narrowly lanceolate, 20–25 cm. long, 2.5–3 cm. wide, gradually narrowed at both ends, glabrous, shining, coarsely sinuate-repand; petioles 1–3 cm. long; spikes terminal, sessile; bracts oblong, 2.5 cm. long, acuminate, puberulent, pectinate-dentate; corolla 2.5–3 cm. long, orange-scarlet, the upper lip erect, entire, the lower lip 3-lobed, the lobes subequal, the middle one oval, the lateral ones oblong-lanceolate.

Aphelandra Seibertii Leonard. Found at La Colombiana, Prov. Limón, and in Talamanca. The type was collected in the vicinity of El Valle de Antón, Panama, *Seibert 460*. Herbs, up to 20 cm. high, ascending, rooting at the lower nodes, pilose, the hairs up to 1 mm. long; leaf blades oblong-elliptic, 2–9 cm. long, 1.5–5 cm. wide, obtuse, narrowed at the base, entire or undulate, both surfaces thinly pilose, the costa and lateral veins densely so; petioles 1–1.5 cm. long, densely pilose; flowers borne in 1 or several terminal spikes 4–8 cm. long, the peduncles 3–5 cm. long, densely yellowish-pilose, the rachis pilose, the bracts obovate or oblanceolate, 13–15 mm. long, 5–7 mm. wide, purplish at the tip, closely imbricate, appressed (spreading at maturity), hirsute, the hairs up to 1 mm. long, with 2 or 3 narrow, erect-spreading teeth on each side above the middle; bractlets lanceolate, 8 mm. long, 1.5 mm. wide, acuminate, carinate, conduplicate, subhyaline, delicately nerved, sparingly ciliolate; calyx segments subhyaline, striate-nerved, the posterior segment lanceolate, 6.5 mm. long, 1.5 mm. wide, the anterior pair lanceolate, 6.6 mm. long and 1 mm. wide, the middle pair subulate, 5.5 mm. long and 0.5 mm. wide, all sparingly ciliolate with minute, capitate hairs; corolla 2 cm. long, yellow, the lobes tipped with lavender, finely and sparingly pubescent, the tube slender, 3 mm. in diameter at the mouth, the limb about 13 mm. broad, the lobes rounded or emarginate; stamens slightly exserted; capsule about 1 cm. long, cylindric, glabrous except the pilose tip, 4-seeded; seeds obovoid, acute at the base, light brown, 3 mm. long and 2.5 mm. broad; with scattered, minute, short, thick hairs.

Aphelandra Sinclairiana Nees. Low, damp woods. Costa Rica and Panama. Shrubs or small trees, up to 5 meters high; stems hirsute; leaf blades oblong-lanceolate, up to 35 cm. long and 10 cm. wide, acuminate, narrowed at the base, sparingly hirsute or the costa and lateral veins densely so; petiole 1–2 cm. long; spikes terminal, solitary or several in a cluster, up to 20 cm. long, the rachis hirsutulous; bracts orange-red, oval, about 2 cm. long and 1 cm. wide, silky-puberulent, bearing several well defined glands on either side, the upper bracts rounded or obtuse, closely imbricate, the lower acute and spreading; bractlets lance-ovate, 6 mm. long, 2 mm. wide, acute, sometimes bearing one or more minute teeth on either side, puberulent, striate; calyx segments lanceolate, 9–10 mm. long, acute (tipped by a slender awn 0.5 mm. long), a few hairs near the tip, striate; corolla rose-red or purplish red, finely pubescent, about 6 cm. long, the tube 3 mm. in diameter at the base, 6–7 mm. at the mouth, the upper lip erect, 15 mm. long and 8 mm. wide, 2-lobed, the lobes lance-ovate, acute, about 6 mm. long, the lower lip spreading, the middle lobe 21 mm. long, 7–8 mm. wide, acuminate, carinate, the lateral lobes attached by one edge to the upper lip, the free portion triangular-ovate, 2.5 mm. long and 2 mm. wide, obtuse; capsules 2 cm. long, clavate, puberulent, obtuse at the apex, 6 mm. broad near the tip, 3 mm. broad at the base; seeds flat, about 3.5 mm. in diameter, minutely hispidulous.

Aphelandra Storkii Leonard, sp. nov.—Suffrutex, caulibus pilosis vel glabris; lamina foliorum ovata, apice breviter acuminata, basi angustata, in petiolum decurrens, pilosa, undulata; spica terminalis, rhache dense pilosa; bracteae imbricatae, ovato-oblongae, acutae, supra puberulentae, subtus pilosae, medio glandulas parvas rotundas sessiles submarginales gerentes, medio minute denticulatae; bracteolae lineari-lanceolatae, pilosae, striatae; calycis segmenta anguste lanceolata, minute pilosa, striata; corolla pilosa, bilabiata, labio superiore acuto, apice bidentato, inferiore trilobo, lobo mediali acuto, lateralibus minoribus obtusis.

Suffrutescent; stems terete, more or less pilose toward the tip, glabrous below; leaf blades ovate, 15–20 cm. long, 10–11 cm. wide, short-acuminate, abruptly narrowed at the base and decurrent on the petiole, undulate, sparingly pilose above, densely so beneath, the veins prominent, coarsely reticulate toward the margin; petioles about 10 cm. long, winged; spikes terminal, 11 cm. long or more, about 2 cm. in diameter, the bracts closely imbricate, the rachis densely spreading-pilose; bracts oblong-ovate, 25–28 mm. long, 10–12 mm. wide, acute, red(?), veiny, puberulent above, pilose beneath, bearing at the middle on the margins one to several minute, ascending teeth about 0.25 mm. long, with a number of small, round, sessile, submarginal glands near the middle; lateral bractlets linear-lanceolate, 12 mm. long, 2.5 mm. wide near the base, narrowed to a slender point, pilose, striate; calyx segments subequal, 13–14 mm. long, narrowly lanceolate, the posterior segment 3.5 mm. wide, the anterior pair 2.5 mm. wide, and the lateral pair 2 mm. wide, all gradually narrowed to a slender point, minutely pilose, striate; corollas red(?), pilose, the upper lip erect, acute, 2-toothed at the apex, the lower lip 3-lobed, probably spreading, its middle lobe acute, much larger than the obtuse lateral ones (mature corolla not seen).—Livingston, Río Reventazón, July to August, 1920, *Rowlee & Stork 690* (type in U. S. Nat. Herb., No. 1,081,476). Related to *A. Deppeana*, but easily separated by its much larger bracts with very small teeth. In *A. Deppeana* the bracts are rarely as much as 15 mm. long, whereas in this new species they are at least 25 mm. long.

Aphelandra tetragona (Vahl) Nees. Wet forests. Costa Rica to northern South America, also Martinique. A shrub, the tips of the branches densely hirtellous; leaf blades elliptic to ovate or broadly lanceolate, 8–40 cm. long, 3–11 cm. wide, acuminate, narrowed at the base and decurrent on the petiole, thin, entire or undulate, both surfaces usually rather sparingly hirtellous; spikes terminal, solitary or several in a cluster, 2–20 cm. long, subquadrangular in cross section; bracts ovate to lanceolate, 8–10 mm. long, 3–5 mm. wide, acute to obtusish at the apex, puberulent, sometimes ciliolate, with a number of small, round, sessile, submarginal glands, the rachis tomentose or occasionally subglabrous; lateral bracts lanceolate, 8 mm. long, 2 mm. wide; calyx segments lanceolate to ovate, 7–8 mm. long, the posterior segment about twice as wide as the others, all acute, striate, chartaceous, ciliolate toward the apex; corolla scarlet, puberulent, 4–7 cm. long, the upper lip erect, about 2 cm. long, divided from the middle into 2 curved, acuminate lobes, the lower lip ringent in fully expanded flowers, the middle lobe lanceolate, about 22 mm. long, 7 mm. wide, acute, the lateral lobes about 5 mm. long, rounded or occasionally notched at the apex, connate to the upper lip for about two-thirds their length; capsules about 17 mm. long and 6 mm. in diameter near the tip, narrowed to 3 mm. at the base, glabrous, minutely dotted; seeds flat, reddish brown, about 5 mm. long and 4 mm. wide, minutely roughened.

Aphelandra Tonduzii Leonard, sp. nov.—Herba, caulibus erectis vel adscendentibus, hirsutis vel strigosis; folia petiolata, laminis ovatis, ellipticis vel late lanceolatis, apice acutis, obtusis vel rotundatis, basi angustatis, integris, pilosis; spicae axillares, graciles, laxae, pedunculatae, pilosae; bracteae lanceolatae, venosae, hirsutae, utroque latere minute unidentatae; bracteolae subulatae, subhyalinae, striatae, apicem versus glanduloso-pubescentes; corolla pallide rosea, intus pilosa, lobis obovatis, rotundatis; stamina inclusa; capsulae obtusae, glabrae; semina obovata, plana, brunnea, sparse pubescentia.

Herbs; stems up to 22 cm. high, simple, erect or ascending, hirsute or occasionally strigose; leaf blades ovate to elliptic, or broadly lanceolate, up to 18 cm. long and 5.5 cm. wide, acute to obtuse or rounded at the apex, narrowed at the base, entire, both surfaces pilose, the hairs about 1 mm. long; petioles up to 2 cm. long, pilose; flowers borne in slender, lax, peduncled, axillary spikes up to 15 cm. long, the rachis pilose; peduncles up to 16 cm. long, pubescent or occasionally strigose; bracts lanceolate, about 7 mm. long and 1.5 mm. wide, tapering to a slender point, veiny, hirsute (the hairs up to 1 mm. long), usually with a pair of minute, slender, marginal teeth; bractlets subulate, about 5 mm. long and 1.5 mm. wide at the base, striate-nerved, subhyaline, finely pubescent toward the tip, some of the longer hairs gland-tipped; calyx segments 4.5 mm. long, the posterior one lanceolate, 1 mm. wide, the other 4 subulate, 0.5 mm. wide, all striate-nerved, subhyaline and pubescent toward the tip with some of the longer hairs glandular; corolla 1.5 cm. long, pale pink, pubescent within above the insertion of the stamens, the tube slender, glabrous, 2 mm. broad at the base and the mouth, constricted below the middle to 1.5 mm., the limb 12 mm. broad, the lobes obovate, rounded, the 2 upper ones about 3 mm. long and 2 mm. wide, the middle lobe of the lower lip 5 mm. long and 3.5 mm. wide, the lateral ones slightly smaller, all sparingly and minutely pubescent without; stamens included; capsules 10 mm. long and 3 mm. wide, blunt at the apex, glabrous; seeds obovate, flat, brown, about 2.5 mm. long, sparingly pubescent with small, short, thick hairs.—Forests of Las Vueltas, Tucurrique, 900–1,000 meters, January, 1899, *Tonduz 13162* (type in U. S. Nat. Herb., No. 938,550). El Silencio de San Ramón, 950 meters, *Brenes 3693*. Edge of forest in the vicinity of El General, Prov. San José, 1,070 meters, *Skutch 3004*. Moist forests of Cerro de La Carpintera, Prov. Cartago, 1,500–1,850 meters, *Standley 34205, 34495*. Deep woods of La Carpintera, *Stork 1082*. Dissimilar to all other species of *Aphelandra* hitherto described from Central America, because of its slender spikes and extremely narrow, pubescent bracts. Its closest relative is, probably, *A. Seibertii* Leonard.

Aphelandra tridentata Hemsl. Biol. Centr. Amer. Bot. 2: 513. 1882. Costa Rica, without definite locality, *Endres 236*. Specimens examined from San Ramón and the vicinity of Tilarán, Guanacaste. Found in wet or damp forests. Shrubs, up to 2 meters high; young stems densely villous; leaves oblong-ovate to elliptic, up to 30 cm. long and 8 cm. wide, acuminate, narrowed at the base, decurrent on the petiole, sparingly hirsutulous or the costa and lateral nerves densely so; spikes solitary and terminal, up to 10 cm. long and 3 cm. in diameter; bracts oblong-lanceolate, 3–4 cm. long, 8–10 mm. wide (the uppermost often much smaller), acuminate, villous, often with 1 to several subulate teeth on each side; bractlets linear, 10–13 mm. long, about 2 mm. wide at the base, densely and softly hirsute; calyx segments as long as the bractlets, 2–3 mm. wide at the base, gradually narrowed to a slender tip, striate-nerved, appressed-pilose; corolla 5–6 cm. long, bright red, villous, the upper lip oblong, entire, about 15 mm. long and 7 mm. wide, the lower lip elliptic, slightly longer than the upper, 3-toothed at the apex, the teeth deltoid, about 0.5 mm. long; stamens scarcely exserted; capsules oblong, 16 mm. long, about 6 mm. broad, blunt at the apex, glabrous, minutely punctate, shining; seeds dark brown, flat, about 4 mm. long and 3 mm. wide, minutely pilosulous.

BARLERIA L.

Shrubs or herbs; leaves often with axillary spines, the blades entire; flowers often yellow; corolla with a tube about as long as the spreading limb, sometimes longer, the lobes 5, rounded; stamens 4, didynamous, 2 perfect and 2 imperfect (staminodes), the anther sacs blunt at the base; capsules oblong or club-shaped; seeds compressed, ovate or orbicular.—Several species other than the one described here grow in South America and the West Indies.

Barleria micans Nees. *Barleriopsis glandulosa* Oerst. Vid. Medd. Kjoebenhavn 1854: 134. 1855 (Cartago, *Oersted*). Found in forests and thickets from Mexico to Colombia. Herbaceous or suffruticose, up to 1.5 meters high; leaves ovate to narrowly lanceolate, up to 25 cm. long and 8 cm. wide, long-acuminate, attenuate at the base and decurrent on the petiole, sparingly strigose or hirtellous; flowers borne in dense, sessile, terminal spikes 3–8 cm. long and about 3 cm. in diameter; bracts lance-ovate to broadly ovate, 1–1.5 cm. long, 5–7 mm. wide, acute or obtuse, strigose and hirsute-ciliate, minutely toothed, bluish when dry; lateral bractlets linear, 1.5–2 cm. long; calyx segments very unequal, the anterior segment oblong, 1.5–2 cm. long, 1–1.4 cm. wide, bidentate at the apex, the posterior segment slightly longer and narrowed, acuminate at the apex, both bordered by spine-tipped teeth up to 4 mm. long, the lateral segments narrowly lanceolate and about one-half as long as others; corolla 5–5.5 cm. long, turning bluish purple when dry, the tube slender, the lobes oblanceolate, subequal, spreading; capsules 4-seeded.

BELOPERONE Nees

Herbs or shrubs; leaves usually elliptic or ovate, entire; flowers fasciculate in the axils of the bracts, or cymose, or sometimes borne in spikes or in terminal thyrsi, the bracts small or large; calyx 5-parted, the segments narrow; corolla purple or white, the tube slender, elongate, scarcely ampliate above, the limb deeply 2-lipped, the upper lip narrow, erect, entire or minutely 2-lobed, the lower 3-lobed; stamens 2, the anther cells unequal, usually superposed, at least the lower one mucronate or calcarate at the base; staminodes none; capsules clavate, 4-seeded.—A genus limited to tropical America.

Flowers white; capsules glabrous.....................*B. urophylla.*
Flowers purple; capsules puberulent.
  Spikes short, dense; bracts lanceolate, about 1 cm. long, obtuse. *B. Brenesii.*
  Spikes slender, lax; bracts subulate, about 4 mm. long. *B. variegata.*

Beloperone Brenesii Leonard, sp. nov.—Herbae erectae, caulibus quadrangularibus, angulis pilosis; lamina foliorum ovata, apice breviter acuminata, basi angustata, pilosa; petioli pilosi; bracteae lanceolatae, obtusae, pilosae, ciliatae; bracteolae anguste lanceolatae, asymmetricae, ciliatae, pilosae; calycis segmenta lineari-subulata, pilosa; corolla roseo-purpurea, pubescens, bilabiata, labio superiore acuto, subapiculato, inferiore trilobato, lobis oblongis; antherae loculi superpositi, basi calcarati; capsulae minute pubescentes, pilis retrorsis.

Erect herbs, up to 40 cm. high or more; stems quadrangular, the angles densely brownish-pilose, the hairs up to 1 mm. long, or the basal portions subterete and glabrescent; leaf blades ovate, up to 5 cm. long and 3 cm. wide, short-acuminate (the tip blunt), narrowed at the base, both surfaces pilose; petioles up to 2 cm. long, pilose;

flowers borne in dense, terminal spikes or narrow thyrsi up to 10 cm. (usually 3–4 cm.) long; rachises and peduncles (1–2 cm. long) pilose; bracts lanceolate, about 1 cm. long and 2.5 mm. wide, obtuse, pilose and ciliate (sometimes sparingly so), the hairs up to 2 mm. long; bractlets narrowly lanceolate, asymmetric, 9 mm. long, 1.5 mm. wide, ciliate and pilose; calyx segments linear-subulate, 5 mm. long, 0.75 mm. wide, sparingly pilose; corollas 2.5 cm. long, pubescent, rose-purple, the tube slender, 1.5 mm. in diameter at the base, 3–4 mm. at the mouth, the lips about 7 mm. long, the upper one acute or subapiculate, the lobes of the lower lip oblong, about 3 mm. long and 1.5 mm. wide; anther lobes superposed, both calcarate at the base, the spur of the lower one 0.75 mm. long, that of the upper one about half as long; capsules clavate, 1 cm. long, puberulent, the hairs retrorse.—Los Angeles de San Ramón, 1,050 meters, November 20, 1923, *Brenes 3948* (type in Herb. Field Mus., No. 851,797). Cataratas de San Ramón, *Brenes 20518.* Los Angeles to Piedades de San Ramón, *Brenes 4767.* Without definite locality, *Brenes 13420.* Santo Domingo de Vara Blanca, *Manuel Valerio 1549, 1553.* Well marked by the densely pilose angles of the stems and by the relatively broad, short, crowded spikes or thyrsi.

Beloperone urophylla Lindau in Pittier, Prim. 2: 316. 1900. Forests of Boruca, 450 meters, *Tonduz 4077.* Forests of Costa Rica and Panama. Suffrutescent; stems terete, glabrous or finely pubescent in 2 lines; leaf blades ovate to oblong-ovate, up to 17 cm. long and 7 cm. wide, acuminate and subfalcate at the apex, the tip blunt, narrowed at the base, glabrous or the veins beneath sparingly pubescent, the cystoliths numerous and conspicuous; petioles 8–12 mm. long, pubescent above with curved hairs; flowers borne in 1 to several terminal or subterminal, dense spikes up to 8 cm. long and about 4 mm. in diameter, imbedded in furrows of the rachis, the peduncles up to 3 cm. long, pubescent in 2 lines, the rachis glabrous or puberulent; bracts and bractlets linear-subulate, up to 5 mm. long, sparingly and minutely pubescent; calyx segments subulate, 4 mm. long, minutely and sparingly pubescent; corolla 3–3.5 cm. long, finely pubescent, white, the tube slender, 2 mm. in diameter, narrowed above the ovary, thence enlarged to 4 mm. at the mouth, the lips about 12 mm. long, the upper one minutely bidentate at the apex, the lobes of the lower lip about 7 mm. long, rounded; anther lobes superposed, the connective about 1 mm. long; capsules 13–15 mm. long, clavate, glabrous; seeds flat, brown, glabrous, about 3 mm. in diameter.

Beloperone variegata Lindau in Pittier, Prim. 2: 315. 1900. *Streblacanthus chirripensis* Lindau, Bull. Herb. Boiss. II. 4: 404. 1904 (near Hacienda de Chirripó, 200 meters, shaded places, *Pittier* 16046). Forests of Cerro del Volcán, near Boruca, 1,200 meters, *Tonduz 6735*. Forests. Endemic. An herb up to 20 cm. high; stems ascending, rooting at the lower nodes, terete, densely brownish-pubescent, the hairs retrorsely curved; leaves few, the blades ovate to oblong, up to 13 cm. long and 7 cm. wide, obtuse or rounded at both ends, glabrous above, the costa and veins pubescent beneath, the cystoliths numerous and conspicuous; petioles 3–15 mm. long, pubescent; flowers borne in terminal or subterminal, slender, simple or forked spikes up to 12 cm. long, the rachis and peduncles (up to 10 cm. long) densely and softly pubescent, the internodes 10–15 mm. long at the base of spike, successively shorter toward the tip; bracts narrow-subulate, about 4 mm. long, pubescent; bractlets similar but smaller; calyx segments 5–6 mm. long, about 0.5 mm. wide, pubescent; corolla 12 mm. long, light purple, pubescent, the tube slender, 1 mm. in diameter at the base, 2 mm. at the mouth, the upper lip 5–6 mm. long, 3 mm. wide, minutely bidentate at the apex, the lower lip 5 mm. long, the middle lobe about 2.5 mm. in diameter, the lateral lobes 2.5 mm. long and 2 mm. wide; anther lobes superposed, the lower calcarate; capsule clavate, 10–11 mm. long, puberulent; seeds flat, glabrous, 2.5 mm. in diameter.

The description of *Ecbolium Chamaeranthemum* Kuntze (Rev. Gen. 2: 487. 1891; type from Limón, *Kuntze*) suggests this in many respects. Should the two species prove identical, the name *variegata* would be replaced by *Chamaeranthemum.* I do not feel that this transfer is justifiable at present, since I have been unable thus far to examine any of Kuntze's type material.

BLECHUM P. Br.

Perennial herbs; leaves petioled, repand-dentate, crenate or entire; flowers borne in dense, terminal spikes, the bracts imbricate; calyx 5-parted, the segments slightly unequal, linear-subulate; corollas whitish, the tube slender, the limb almost equally 5-lobed; stamens 4, didynamous, the anther sacs parallel; ovules few in each cavity; capsules broadly oblong, with a short, narrowed base.—Other species occur in Central America.

Corolla 12–13 mm. long; bracts grayish-puberulent. *B. pyramidatum.*

Corolla 20–25 mm. long; bracts sparingly puberulent and pilose. *B. costaricense.*

Blechum costaricense Oerst. Vid. Medd. Kjoebenhavn 1854: 168. 1855. Cerro de Aguacate, *Oersted.* Wooded regions of the Provincia de San José. Herbaceous, or suffrutescent at base, stems pilose or the lower portions glabrescent; leaf blades ovate to oblong, up to 12 cm. long and 4 cm. wide, acuminate, the tip blunt, narrowed at the base and decurrent on the petiole, entire or shallowly sinuate-dentate, both surfaces pilose with stiff hairs up to 1.5 mm. long, or the costa and lateral veins of the lower surface minutely strigose, the cystoliths prominent; petioles slender, up to 3 cm. long; spikes ovoid, up to about 3 cm. long, 2 cm. in diameter, the rachis finely pubescent; bracts ovate, 1.5 cm. long and 1 cm. wide, acuminate at the apex, rounded at the base, entire, sinuate, or the lower ones shallowly dentate, sparingly pilose within, puberulent without, the hairs appressed and confined chiefly to the costa and veins, the margins ciliate with spreading, white hairs up to 2 mm. long; bractlets lanceolate, 11 mm. long, 2 mm. wide, obtuse, conspicuously white-ciliate; calyx 5 mm. long, the segments 0.5 mm. wide at the base, ciliate, with a tuft of longer hairs at the tip; corolla pale lavender, 20–25 mm. long, finely pubescent, the lower portion of the tube slender, narrowly campanulate above, about 5 mm. broad at the throat, the limb 2 cm. broad when fully expanded, the lobes suborbicular, rounded or shallowly emarginate; capsules ovoid, about 6 mm. long and 5 mm. broad, puberulent, 4-seeded.

Blechum pyramidatum (Lam.) Urb. *Sornia.* Banks, fields, damp woods, thickets, and sometimes a weed in cultivated land. General in tropics of America and the Old World. Stems erect or ascending, 20–70 cm. high, the branches slender, more or less puberulent; leaf blades ovate, 2–7 cm. long, 1–5 cm. wide, acute or obtuse, obtuse or narrowed at the base, glabrous or sparingly pilose, thin; spikes 4-sided, 3–6 cm. long; bracts ovate, pinnately veined, 1–2.5 cm. long, about 1 cm. wide, acutish at the apex, rounded at the base, gray-puberulent and pilosulous, ciliate; corolla 12–13 mm. long, pubescent; capsule broadly oblong, about 6 mm. long, puberulent. Much used in the vicinity of Tilarán as a remedy for amebic and other dysentery (*Standley*).

BRAVAISIA DC.

Shrubs or small trees; leaves petioled, entire; inflorescence a terminal, subcorymbose panicle, each flower subtended by a pair of bracts; calyx segments 5, subcoriaceous; corolla white or purplish, the tube rather abruptly expanded above the ovary, the lobes 5, subequal, rounded, spreading; stamens 4, the anther cells contiguous, spurred at the base; ovules 2–4 in each cell.—Several species of this genus are found in Central America.

Bravaisia integerrima (Spreng.) Standl. *Palo de agua, Mangle blanco. Onychacanthus speciosus* Oerst. Vid. Medd. Kjoebenhavn 1854: 131. 1855 (near Puntarenas, *Oersted*). Found in wet, wooded regions. Ranging from the Mexican states Tamaulipas and Guerrero to Trinidad, Venezuela, Colombia, and Peru. A dense tree, up to 18 meters high, the branches subquadrangular, glabrous or the young tips finely pubescent; petioles 3–5 cm. long, connate at the base; leaf blades oblong-elliptic, 8–28 cm. long, 3–10 cm. wide, acuminate or acute, narrowed at the base, subcoriaceous, glabrous, or the costa and lateral veins pilosulous below; panicle leafy, subcorymbose, about 12 cm. long and 10–30 cm. in diameter; bractlets subtending the flowers ovate, 2–3 mm. long, subcarinate, puberulent and ciliolate; calyx 4–5 mm. long, the segments ovate, 3–4 mm. long, 2–3 mm. wide, obtuse or rounded, puberulent and ciliolate; flowers white (occasionally yellow), with a purple spot at the throat, glabrous, the tube about 8 mm. broad at the throat, the limb nearly regular, about 2 cm. broad, the lobes emarginate; capsules oblong, 10–12 mm. long, obtuse at the apex, rounded at the base, 4-seeded.

BUCERAGENIA Greenm.

Herbs; leaves petiolate, usually ovate or oblong-elliptic; flowers borne in a leafy panicle, the branches lax, the flowers single or several in a cluster; bracts and bractlets minute; calyx segments 5, linear, subequal; corolla tubular, the limb 2-lipped, the posterior lip incurved, emarginate or 2-lobed, the anterior lip erect or scarcely spreading, 3-lobed; stamens 2, inserted at the middle of the corolla tube, included; anthers 1-celled, oblong, obtuse; staminodes 2; capsule oblong, narrowed below to a slender stipe; seeds 4, flattened, suborbicular, roughened.—The name is of Greek origin and refers to the Spanish name Cuernavaca, the Mexican locality of the type species. Several species occur in Mexico.

Buceragenia glandulosa Leonard, sp. nov.—Herba vel suffrutex, caulibus glabris vel sparse bifariam pilosulis; folia petiolata vel suprema sessilia vel subsessilia, laminis ovatis ad oblongis, apice acuminatis, basi cuneatis vel rotundatis vel supremis subcordatis, in petiolum decurrentibus; spicae terminales et axillares, floribus solitariis vel fasciculatis; rachis glanduloso-pilosula; bracteae et bracteolae anguste triangulares, glabrae; calycis segmenta lanceolata, subglabra; corolla minuta, tubo ovoideo, lobis orbicularibus; capsulae clavatae, glabrae; semina plana, marginibus asperis.

Herbaceous or suffrutescent, up to 2 meters high; stems glabrous or sparingly pilosulous in 2 lines, with numerous subpunctiform cystoliths; leaves petioled or the uppermost sessile or subsessile, the blades ovate to oblong, up to 15 cm. long and 7 cm. wide, acuminate (the tip blunt), acute to obtuse or rounded at the base (the uppermost subcordate) and decurrent on the petiole, thin, glabrous, the costa red-purple, the cystoliths numerous, slender; petioles up to 6 cm. long; flowers solitary or fascicled, borne in terminal and axillary spikes, these forming a large, terminal panicle, the internodes about 2 cm. long at the base of the spike, thence successively shorter toward the tip, the uppermost fascicles confluent, the rachis glandular-pilosulous; pedicels up to 1 mm. long; bracts narrowly triangular, about 2 mm. long, glabrous; bractlets similar but smaller; calyx segments lanceolate, 3.5 mm. long, 1 mm. wide at the base, acuminate, essentially glabrous; corollas 2 mm. long, glabrous, the tube ovoid, the lobes orbicular, about 0.25 mm. in diameter; capsules about 14 mm. long, glabrous, the stipe slender; seeds flat, the margins roughened.—Tres Ríos, near San José, 1,400 meters, January 17, 1916, *Holway 440* (type in U. S. Nat. Herb., No. 862,612). Wet forest of Cerro de La Carpintera, Prov. Cartago, 1,500–1,850 meters, *Standley 35503*. Wet forests of El Muñeco, south of Navarro, Prov. Cartago, 1,400 meters, *Standley 33686*. Although this plant easily may be mistaken for *Pseuderanthemum cuspidatum* (Nees) Radlk., it can be recognized by its fascicled flowers, minute corollas, and glandular-pilosulous rachis.

CARLOWRIGHTIA Gray

Plants herbaceous or suffrutescent; leaves entire; flowers borne in loose spikes or racemes, these often forming large, terminal panicles; calyx segments 5; corolla tube slender, scarcely dilated, the limb almost equally 4-cleft; stamens 2; anther cells equal, inserted at the same height; staminodes none; capsule stipitate, 4-seeded.—A genus of about 20 species, chiefly of Mexico.

Carlowrightia costaricana Leonard, sp. nov.—Suffrutex, caulibus teretibus puberulentis; lamina foliorum elliptico-ovata, obtusa (supremae mucronatae), basi obtusa vel rotundata, supra puberulenta vel subglabra; petioli tenues puberulenti; inflorescentia paniculata, spicis numerosis laxis curvatis, rhachibus minute puberulentis; bracteae et bracteolae subulatae, puberulentae; calycis segmenta triangularia, griseo-puberulenta; corolla pubescens; capsulae glabrae; semina albida, minute rugosa.

Erect, suffrutescent, about 60 cm. high; stems terete, puberulent; leaf blades elliptic-ovate, up to 4.5 cm. long and 2.5 cm. wide, acute (the uppermost mucronate), rounded or obtuse at the base, puberulent or subglabrous above; petioles slender, up to 1 cm. long, puberulent; flowers borne in numerous lax, curved spikes forming a terminal panicle up to 20 cm. long, the rachises minutely puberulent or subglabrous, the lower internodes about 8 mm. long, the others successively shorter toward the tip of the spikes; bracts and bractlets subulate, up to 3 mm. long, puberulent; calyx segments triangular, 1.5 mm. long, 0.5 mm. wide at the base, minutely grayish-puberulent; corolla about 7 mm. long, pubescent, purplish(?), the limb about 9 mm. broad; capsules up to 11 mm. long and 4 mm. wide, pointed, glabrous; seeds whitish, minutely roughened.—Dry forests in the vicinity of Líbano, Prov. Guanacaste, 260–360 meters, January 15, 1926, *Standley & Valerio 44890* (type in U. S. Nat. Herb., No. 1,253,830). In general appearance this species is closest to *C. glabrata* Fernald, of central Mexico, but differs in the nature of its pubescence and in its smaller leaf blades and larger capsules. The rachises of *C. glabrata* are pilose, instead of minutely puberulent.

CHAETOCHLAMYS Lindau

Flowers usually borne in congested, terminal and axillary spikes or heads; bracts and bractlets narrow; calyx segments 5, narrow; corolla tube but slightly enlarged at the throat, the limb 2-lipped, the upper lip 2-lobed, the lower 3-lobed; stamens 2; anther lobes affixed at different heights, the lower calcarate; staminodes none; stigma capitate; capsules 4-seeded.—Several species are found in South America.

Chaetochlamys panamensis Lindau. Forests and thickets of Costa Rica and Panama. Herbs, up to 1 meter high, erect or decumbent; stems terete, pubescent in 2 lines (the hairs retrorsely curved) or glabrous below; leaf blades oblong-lanceolate, up to 10 cm. long and 3 cm. wide, firm, acuminate at both ends, glabrous or sparingly hirtellous beneath, the cystoliths prominent; petioles up to 10 mm. long, minutely strigose or glabrous; flowers borne in terminal and axillary heads; bracts linear, about 12 mm. long and 1 mm. wide, pilose, the hairs white, up to 1.5 mm. long; bractlets similar but narrower; calyx segments lanceolate, about 1 cm. long, 2 mm. wide, the costa and margins pilose; corolla pubescent, rose-purple, the tube 15 mm. long, 3 mm. in diameter, the upper lip 8 mm. long and 4 mm. wide, the lobes rounded, 2 mm. in diameter, the lower lip 11 mm. long, the lateral lobes 6 mm. long and 7 mm. wide, the middle one 8 mm. long and 10 mm. wide; capsules 10–12 mm. long, about 4 mm. in diameter, narrowed and solid at the base, glabrous.

CHAMAERANTHEMUM Nees

Herbaceous or suffrutescent; inflorescence terminal, paniculate or spicate, the flowers and bracts small; calyx segments narrow, equal; corolla hypocrateriform or infundibular, the tube slender, the lobes of the limb subequal; stamens 4, included, the anthers of the posterior stamens 1-celled or sterile; capsules 4-seeded, reduced below to a slender, sterile stipe; seeds discoid.—Two other species are found in Central America. Several grow in northern South America.

Leaf blades hirsute................................*C. Durandii.*
Leaf blades glabrous...............................*C. Tonduzii.*

Chamaeranthemum Durandii Leonard, sp. nov.—Suffrutex, caulibus subquadrangularibus, hirsutis; lamina foliorum oblonga, acuminata, basi angustata, hirsuta; petioli breves, hirsuti; spicae terminales, laxae, rhache hirsuta; bracteae et bracteolae subulatae, puberulentae; calycis segmenta subulata, glanduloso-puberulenta; corolla puberulenta, lobis rotundatis; stamina postica sterilia.

Suffrutescent herbs 20 cm. high or more; stems subquadrangular, hirsute, the hairs 0.5 mm. long, arranged in 2 lines, or more or less scattered; leaf blades oblong, acuminate (the tip blunt), narrowed at the base, hirsute, the hairs up to 1 mm. long; petioles about 3 cm. long, hirsute; flowers borne in lax, terminal spikes about 5 cm. long, the rachis hirsute; bracts and bractlets subulate, up to 1 mm. long, sparingly puberulent; calyx segments subulate, 3 mm. long, 0.5 mm. wide at the base, glandular-puberulent; corollas 4.5 mm. long (immature), finely pubescent, the lobes about 2 mm. long and 1.5 mm. wide, rounded; posterior stamens sterile.—Thickets along Río Ceibo, Buenos Aires, 200 meters, January, 1892, *Tonduz 6702* in part (type in U.S. Nat. Herb., No. 59,938). Distinct from *C. Tonduzii* in its hirsute foliage and inflorescence.

Chamaeranthemum Tonduzii Lindau in Pitt. Prim. 2: 303. 1900. Forests of Térraba, *Pittier 3984*. Herbs; stems erect, up to 50 cm. high, simple or sparingly branched, pilosulous in 2 lines at the tips, otherwise glabrous, terete; leaf blades oblong-lanceolate, 3–9 cm. long, 1–2.5 cm. wide, acuminate, the tip blunt, rounded or narrowed at the base, both surfaces glabrous and bearing numerous cystoliths; petioles 1–3 mm. long; inflorescence a sparingly branched panicle of lax spikes 2–9 cm. long, the flowers secund, the rachis sparingly puberulent; bracts and bractlets subulate (or the lowermost bracts linear-lanceolate), 2–8 mm. long, glabrous or sparingly puberulent; calyx segments subulate, about 3 mm. long, glandular-puberulent; corolla about 10 mm. long, minutely pubescent, the limb about 1 cm. broad, the lobes rounded; anthers of the posterior pair of stamens 1-celled or sterile, those of the anterior pair 2-celled; capsules about 15 mm. long, the upper portion 2–3 mm. broad, finely pubescent.

DICLIPTERA Juss.

Herbs; leaves entire, usually ovate, petioled; inflorescence spicate, cymose, or paniculate, the flowers 1–several, subtended by an involucre of 2–4 conspicuous bracts, the cymes often contracted; calyx 5-parted, hyaline; corolla narrow, slightly ampliate, the limb 2-lipped; stamens 2, the anther sacs often unequal, the longer ones sometimes calcarate at the base; staminodes none; capsules ovate or suborbicular, the placenta separating elastically from the walls; seeds 2 or 4.—A large genus, found in tropical and subtropical regions in many parts of the world.

Cymes sessile or subsessile (the lowermost sometimes short-peduncled).
  Bracts subtending the flowers small, the larger bract of the pair subtending the middle flower of each cyme up to 9 mm. long and 4.5 mm. wide . . . . *D. imbricata.*
  Bracts subtending the flowers larger, the larger bract of the pair subtending the middle flower of each cyme 10 mm. long and 5 mm. wide or more.
    Flower bracts unguiculate, spine-tipped; corolla 14 mm. long or less, rose-purple . . . . *D. unguiculata.*
    Flower bracts not conspicuously spine-tipped or unguiculate; corolla 2.5–3.5 cm. long, brick-red . . . . *D. pallida.*
Cymes peduncled.
  Inflorescence strongly glandular-pubescent . . . . *D. Skutchii.*
  Inflorescence eglandular (the corolla more or less glandular in *D. iopus*).
    Corolla 14 mm. long; bracts subtending the flowers elliptic or obovate . . . . *D. podocephala.*

Corolla 3 cm. long or more; bracts subtending the flowers oblong.
  Flowers bracts rounded and apiculate; pedicels essentially glabrous.................................*D. trifurca.*
  Flower bracts acute to obtusish; pedicels subtomentose. *D. iopus.*

Dicliptera imbricata Leonard, sp. nov.—Herbae, caulibus ramosis, hexagonis, angulis puberulentis, pilis curvatis; lamina foliorum oblongo-ovata, acuminata, basi angustata, glabra vel in venis puberulenta, pilis curvatis; petioli graciles, puberulenti; inflorescentiae spiciformes, terminales et axillares, compactae, cymis subsessilibus, verticillatis, bracteis viridibus lanceolatis suffultis; bracteae floriferae inaequales, obovatae, trinerviae, basin versus albidae, majores acutiusculae, minores rotundatae; bracteolae lineares, uninerviae, acuminatae, ciliatae, albidae; corolla purpurea; capsulae apice tenuiter pubescentes.

Herbs up to 1 meter high; stems branched, the tips hexagonal, puberulent on the angles with curved hairs, the basal portions subterete and subglabrous; leaf blades oblong-ovate, up to 9 cm. long and 4 cm. wide, acuminate (the tip blunt), narrowed at the base, rather thin, glabrous, or the costa and veins puberulent with curved hairs; petioles slender, up to 5 cm. long, finely pubescent with curved hairs; flowers crowded in terminal, spikelike racemes up to 3 cm. long and 1.5 cm. in diameter, each node producing several short-peduncled, fanlike cymes of 3–5 flowers each, or the lowermost cymes in the axils of the leaves, each cyme subtended by a pair of lanceolate, green bracts about 12 mm. long and 1–3 mm. wide, extending conspicuously beyond the calyces, the bracts subtending the flowers unequal, obovate, whitish toward the base, the larger of the pair subtending the middle flower about 9 mm. long and 4.5 mm. wide, acutish, strongly 3-nerved, the smaller one 7 mm. long and 3 mm. wide, rounded, those subtending the outer flowers similar but successively smaller, all strongly puberulent and ciliate, the hairs 0.5 mm. long; bractlets linear, the outer pair 7 mm. long and 1 mm. wide, the inner 5 mm. long, 0.75 mm. wide, all acuminate, 1-nerved, ciliate, whitish; calyx 3.5 mm. long, subhyaline, the segments subulate, 0.5 mm. wide at the base, ciliolate; corollas 15 mm. long(?), purple; capsules about 5 mm. long, finely pubescent toward the tip. —San Pedro de San Ramón, January 31, 1936, *Brenes 21440* (type in Herb. Field. Mus., No. 866,336). Calera de San Ramón, *Brenes 6533*. Low forests in the vicinity of Capulín, Río Grande de Tárcoles, Prov. Alajuela, *Standley 40107*. Moist forests of La Tejona, north of Tilarán, Guanacaste, 600–700 meters, *Standley & Valerio 45868*. Santiago de San Ramón, *Brenes 17006*. This differs markedly from other species of *Dicliptera* found in Costa Rica in its close, terminal, spikelike inflorescences, small, strongly ciliate bracts, and elongate, leafy bracts subtending the cymes.

Dicliptera iopus Lindau in Pittier, Prim. 2: 305. 1900. Forests of Rancho Flores, 2,045 meters, *Tonduz 2136*. Wet forests of Costa Rica and Panama, and probably elsewhere in Central America. An erect, branched herb, up to 60 cm. high, the branches subhexagonal, pilosulous with small, curved hairs, or glabrous, the hairs chiefly on the angles; leaf blades oblong-ovate, up to 13 cm. long and 9 cm. wide but usually smaller, acuminate, the tip blunt, narrowed at the base, glabrous or pilosulous, the hairs about 0.5 mm. long, mainly on the costa and lateral veins; petioles slender, up to 2, rarely 4 cm. long, subtomentose; flowers borne in peduncled cymes usually of 3 flowers each, the peduncles about 3 cm. long although occasionally as much as 9 cm., pilosulous, the pedicel of the middle flower of each cyme 8–10 mm. long, those of the lateral flowers much shorter, all subtomentose; bracts subtending the cymes resembling small leaves; bracts subtending the flowers linear-oblong, acute to obtusish, pubescent toward the tip, unequal, the larger about 15 mm. long and 4 mm. wide, the others 10 mm. long and 3 mm. wide; bractlets 4, oblanceolate, acute, pubescent toward the tip, the larger pair 10 mm. long and 2.5 mm. wide, the smaller 8 mm. long and 1.5 mm. wide; calyx 8 mm. long, minutely pubescent, the segments linear, gradually narrowed to a slender tip; corolla rose-purple, about 3 cm. long, inflated at the middle, pilose (some of the hairs glandular), the mouth 4–6 mm. in diameter, the posterior lip subentire, about 9 mm. long and 4.5 mm. wide, the lower one 3-lobed, the lobes about 2 mm. long and 1.5 mm. wide.

Dicliptera pallida Leonard, sp. nov.—Herbae erectae, ramosae, caulibus hexagonis, subtomentosis; lamina foliorum ovata, breviter acuminata, basi acuta, hirsuta; petioli subtomentosi; cymae breviter pedunculatae, axillares, bracteis foliosis suffultae; bracteae floriferae inaequales acuminatae, hirtellae, basin versus albidae, majores oblanceolatae ad ellipticae, minores lineares; bracteolae anguste lanceolatae, basin versus albidae; calycis segmenta alba, ciliolata; corolla ferruginea, pubescens, labio superiore emarginato, inferiore minute trilobo; capsulae pubescentes.

An herb, up to about 1 meter high, erect, branched; stems hexagonal, subtomentose or the lower portions glabrescent, the hairs minute and retrorsely curved; leaf blades ovate, up to 10 cm. long and 5 cm. wide, short-acuminate, acute at the base, both surfaces hirsute, the hairs up to 1 mm. long; petioles up to 3 cm. long, subtomentose; flowers borne in short-peduncled, axillary cymes, the peduncles up to 1 cm. long, white-tomentose, the flowers of the upper cymes sessile, those of the lower ones short-pediceled, the pedicel of the middle flower longer than those of the lateral ones, all white-tomentose; bracts subtending the cymes leaflike, 2–3 cm. long, those subtending the flowers (usually 1 fertile flower flanked by 1 or more abortive ones) unequal, the larger of the pair subtending the middle flower of each cyme oblanceolate or elliptic, 1.7 cm. long, 6 mm. wide, the smaller one linear, 11 mm. long and 2 mm. wide, both acuminate, narrowed to a slender point, whitish toward the base, hirtellous, the hairs spreading, up to 1 mm. long, the bracts of the lateral flowers of each cyme similar but successively smaller; bractlets unequal, the outer pair narrowly lanceolate, 12 mm. long and 1.25 mm. wide, ciliate, the inner pair similar but smaller; calyx segments white, lanceolate, 3 mm. long, 0.75–1.25 mm. wide, minutely ciliolate; corollas brick-red, 2.5–3.5 cm. long, pubescent, the tube slender, 2 mm. in diameter at the base, 4 mm. at the mouth, the lips about 8 mm. long, the upper emarginate, the lower minutely 3-lobed; stamens barely exserted; capsules 4–5 mm. long, pubescent.—Wet thicket in the vicinity of Pejivalle, Prov. Cartago, 900 meters, February 7–8, 1926, *Standley & Valerio 46792* (type in U. S. Nat. Herb., No. 1,251,470). Valle de Los Arcángeles, central Costa Rica, 1,700 meters, *Pittier 12305*. Thickets of Las Vueltas, Tucurrique, 635 meters, *Tonduz 12935* (*Donnell Smith 7570*). Shady river bank, vicinity of El General, Prov. San José, 880 meters, *Skutch 2297*. The name *pallida* refers to the whitish bractlets and basal portions of the bracts.

Dicliptera podocephala Donn. Smith, Bot. Gaz. 48: 299. 1909. Damp meadows and river banks. Type from Atirro, Prov. Cartago, *Donnell Smith 6685*. Suffrutescent, up to 1.5 meters high, diffuse, the branches hexagonal, sparingly pubescent; leaf blades ovate-lanceolate, up to 12.5 cm. long and 4.5 cm. wide, acuminate, blunt and sometimes curved, narrowed at the base, thin, glabrous or the veins with a few minute hairs; petioles up to 2.5 cm. long; flowers borne in peduncled capitula, the peduncles up to 9.5 cm. long, solitary or several in each axil, sparingly and minutely appressed-pubescent, the hairs mostly in 2 lines; bracts subtending the capitula narrowly lanceolate, about 5 mm. long, glabrous, sometimes ciliolate, often semicircularly curved; fertile flowers usually 5 or 7 in each capitulum (sometimes accompanied by abortive ones), the bracts subtending the flowers elliptic to obovate, one of each pair slightly larger than the other, the middle pair the largest, the others diminishing in size outwardly, the largest 11–14 mm. long, 8–9 mm. wide, all rounded or obtuse and minutely apiculate at the apex, narrowed at the base, pergamentaceous, sparingly puberulent and ciliolate; bractlets 4, linear-lanceolate, 8 mm. long, puberulent; calyx segments resembling the bractlets but slightly smaller; corolla 14 mm. long, pubescent; capsule ovoid, 5 mm. long, pubescent; seeds puberulent, 2.5 mm. in diameter.

Dicliptera Skutchii Leonard, sp. nov.—Herba diffusa ramosa, caulibus hexagonis, angulis puberulentis, pilis albis curvatis; lamina foliorum ovata ad elliptica, acuminata, basi angustata, membranacea, glabra vel in venis parce puberulenta; petioli graciles, subglabri; pedunculi terminales et axillares, apice triflori; inflorescentiae bracteae foliosae; bracteae floriferae inaequales, lineari-oblongae, glanduloso-hirtellae, longiores apice acutiusculae, breviores obtusiusculae; bracteolae lanceolatae, acutae, glanduloso-hirtellae; calycis segmenta anguste triangularia, puberulenta; corolla purpurea, tenuiter pubescens, labio superiore acuto, apice emarginato, inferiore trilobo, lobis suborbicularibus; ovarium glabrum.

A sprawling herb, up to 1 meter high or more; stems branched, puberulent, the hairs white, curved, distributed in 6 lines; leaf blades ovate to elliptic, up to 16 cm. long and 8 cm. wide, acuminate, narrowed at the base, thin, glabrous, or the costa and veins bearing a few minute hairs; petioles slender, up to 6.5 cm. long, essentially glabrous; flowers in 3's, at the tips of axillary and terminal peduncles, these up to 8 cm. long, puberulent with white, curved hairs; pedicels 1–2 mm. long, hirsutulous, the hairs straight or curved; bracts subtending the pedicels leaflike, about as long as the peduncles; bracts subtending the flower clusters leaflike, usually exceeding the calyx; bracts subtending the flowers unequal, linear-oblong, one 15 mm. long and 3.5 mm. wide, acutish, the other 10 mm. long and 3 mm. wide, obtusish, both glandular-hirtellous; bractlets lanceolate, the outer pair 9 mm. long and 2.25 mm. wide, the inner pair 5 mm. long and 1.5 mm. wide, all 4 acute and glandular-hirtellous; calyx about 9 mm. long, essentially glabrous without, the segments narrowly triangular, 5–6 mm. long, 1.5–2 mm. wide at the base, puberulent within, the hairs appressed upwardly; corollas purple, up to 5 cm. long, sparingly and finely pubescent, the lower half of the tube slender, 2 mm. in diameter at the base, the upper half enlarged to about 10 mm., then reduced to 6–7 mm. at the mouth, the lips about 1 cm. long, one acute, minutely notched at the tip, the other 3-lobed, the lobes suborbicular, about 0.75 mm. in diameter; ovary glabrous; mature capsules not seen.—Woods in the vicinity of El General, Prov. San José, 1,190 meters, December, 1936, *Skutch 3090* (type in U. S. Nat. Herb., No. 1,643,133). From its closest relative, *D. iopus*, the present species can be separated by its glandular-hirsutulous bracts and the coarser pubescence of its stems.

Dicliptera trifurca Oerst. Vid. Medd. Kjoebenhavn 1854: 172. 1855. Between Cartago and Candelaria, 1,800–2,100 meters, *Oersted*. Found chiefly in wet forests in the provinces of Cartago and San José. Endemic. Branching herbs, up to 2 meters high; stems 6-angled, glabrous or the angles minutely strigose; leaf blades oblong-ovate or elliptic, up to 19 cm. long and 7 cm. wide, acuminate, acute at the base, thin, glabrous or the costa and veins sparingly and minutely strigose, both surfaces with minute cystoliths; petioles slender, minutely and sparingly strigose; flowers in 3's, borne in axillary, peduncled cymes; peduncles up to 16 cm. long, glabrous or with a few minute hairs; pedicels up to 5 mm. long, glabrous or with a few small hairs on the angles; bracts subtending the cymes leaflike, equaling or exceeding the calyx, deciduous; bracts subtending the flowers oblong, unequal, one about 9 mm. long, the other about 6 mm. long, both 2.5 mm. wide, rounded and apiculate at the apex, essentially glabrous; bractlets oblong-lanceolate, 6.5 mm. long, 2 mm. wide, acute, 1-nerved, minutely puberulent toward the tip; calyx 7 mm. long, the segments 4 mm. long, about 1 mm. wide at the base, gradually narrowed to a slender point, finely pubescent; corolla about 3 cm. long, pubescent, bright rose-purple, the tube about 12 mm. long, slightly swollen below the mouth, about 5 mm. in diameter at its widest part, the lips subequal, the upper one entire, the lower 3-lobed, the lobes suborbicular, about 0.75 mm. in diameter; capsules 17 mm. long and 5 mm. broad, pointed at the apex, stipitate at the base, retrorsely pubescent; seeds flat, suborbicular, about 4.5 mm. in diameter, with a few papilliform hairs on the margins.

Dicliptera unguiculata Nees. *Sornia, Olotillo.* Common in moist thickets, Mexico to northern South America. Erect or ascending herbs, up to about 1 meter high; stems branched, terete and glabrous below, hexagonal and pubescent toward the tips, the hairs spreading or retrorsely curved, 0.5 mm. long; leaves soon deciduous; leaf blades ovate, up to 8.5 cm. long and 5 cm. wide, acuminate, the tip blunt, narrowed at the base, thin, both surfaces of the younger leaves densely pilosulous but sparingly so at maturity; petioles up to 4 cm. long, pilosulous or subglabrous; flowers crowded in sessile, axillary umbels or in crowded, terminal and axillary, spikelike racemes up to 8 cm. long and about 2 cm. in diameter; bracts spatulate, unequal, the upper suborbicular to ovate, 1–1.5 cm. long, 5–7 mm. wide, the lower about half the length of the upper, both aristate (the awn 2–3 mm. long), hirsutulous, more or less densely ciliate with hairs up to 1 mm. long, 3-nerved; bractlets linear-lanceolate, 4 mm. long, 1-nerved, ciliolate; calyx 3 mm. long, the segments narrowly lanceolate, minutely ciliolate, 1-nerved; corolla 12–14 mm. long, rose-purple, pubescent, the tube slender, the lips subequal, about 7 mm. long, the upper one with 3 minute lobes, the lower emarginate; capsules clavate, 4 mm. long, retrorsely hirsutulous; seeds brownish, flat, suborbicular, 1–1.5 mm. in diameter, with minute, retrorsely barbed hairs. Standley states that this plant is a common remedy for intestinal disorders. According to Raúl Coto Fernández, it has been employed successfully in Costa Rica in treating amebic dysentery; see Revista de Agr. 10: 167. 1938.

DYSCHORISTE Nees

Herbs or woody plants; leaf blades usually ovate to lanceolate, entire, petioled; flowers solitary or clustered in the leaf axils, sometimes terminal; calyx segments 5, very slender; corolla blue, purple, or sometimes white, slightly 2-lipped.—Widely distributed in tropical and subtropical regions of the world. Several species occur in Central America.

Dyschoriste Valeriana Leonard, sp. nov.—Herbae robustae, perennes, caulibus erectis vel adscendentibus, simplicibus vel parce ramosis, quadrangularibus, glabris vel parce pilosulis; lamina foliorum ovata ad oblongo-ovata, rotundata vel obtusa, vel interdum acutiuscula, basi angustata et in petiolum decurrens, membranacea, ciliolata, glabra vel subglabra, novellae minute et sparse pubescentes; petioli glabri vel subglabri; cymae axillares; bracteae foliosae; calycis segmenta subulata, subcarinata, ciliata; corolla pallide purpurea, limbo subbilabiato, lobis ovalibus, rotundatis; capsulae lanceolatae, glabrae.

A robust perennial; stems simple or sparingly branched, erect or ascending, sometimes rooting at the basal nodes, up to 50 cm. high or more, quadrangular, glabrous or sparingly pilosulous; leaf blades ovate to oblong-ovate, 2–7 cm. long, 1–3.5 cm. wide, rounded, obtuse, or sometimes acutish, narrowed at the base and decurrent on the petiole, entire or undulate, thin, ciliolate, the young leaves minutely and sparingly pubescent, the older ones glabrous or the costa and veins with a few small, white hairs, the cystoliths slender; petioles slender, 5–15 mm. long, glabrous or sparingly pubescent; flowers borne in cymose clusters at the nodes and subtended by leaflike bracts 10–15 mm. long and 5–10 mm. wide; calyx 10–11 mm. long, the tube 4 mm. long, glabrous, the segments subulate, 0.75 mm. wide at the base, subcarinate, ciliate; corollas pale purple, 8–10 mm. long, the lobes sparingly puberulent, the tube 2 mm. in diameter at the base, 1 mm. above the ovary, 2.5 mm. at the throat, the limb subbilabiate, the lobes oval, about 3 mm. long, 2–2.5 mm. wide, rounded at the apex, the filaments of the shorter stamens 1 mm. long, those of the longer ones 2.25 mm. long, all glabrous, the anthers slightly less than 1.5 mm. long, minutely calcarate at the base; capsules lanceolate, 8 mm. long, glabrous, 4-seeded.—Vicinity of Tilarán, Guanacaste, alt. 500–650 meters, January 10–31, 1926, *Standley & J. Valerio 46613* (type in U. S. Nat. Herb., No. 1,254,741), *44522, 44965.* Easily recognized by its relatively large, nearly glabrous leaves and small flowers.

ELYTRARIA Michx.

Caulescent or acaulescent herbs; leaves basal or crowded at the ends of the branches; flowers borne in peduncled spikes, both peduncle and spike bearing coriaceous bracts; calyx segments narrow, thin, entire, or the posterior segment bidentate at the apex; corolla small, blue or white.—The genus is composed of about a dozen species, mostly native to tropical or subtropical America.

Elytraria imbricata (Vahl) Pers. *E. tridentata* Vahl. Old fields, grassy banks, bushy slopes, and other waste places. Probably rather common in Costa Rica. Ranging from Arizona and Texas to northern and western South America. Introduced into the Philippine Islands. Usually caulescent, up to 30 cm. high, the leaves crowded at the tips of slender, glabrous or sparingly pilosulous stems; leaf blades oblong to obovate, up to 18 cm. long and 6 cm. wide, blunt or acutish at the apex, narrowed at the base to a slender, winged petiole; scapes numerous, axillary, up to 24 cm. long, simple or branched, covered by closely appressed, sheathing, ovate or subulate bracts; spikes up to 6 cm. long, the bracts elliptic, 3–6 mm. long, ending in an awn and bearing near the tip a pair of triangular or rhombic, scarious teeth; bractlets 3 mm. long; corolla blue, 5–8 mm. long; capsule oblong, glabrous. Extremely variable in habit of growth. Surprisingly enough, the scarious teeth of the flower bracts, one of the main characters on which this species is based, are sometimes much reduced or even entirely lacking. In Salvador, a decoction of the plant is said to be used to alleviate dysentery.

ERANTHEMUM L.

Shrubs or suffrutescent plants; flowers borne in spikes or panicles, the bracts reticulate-veined, imbricate; calyx 5-parted the lobes often scarious; corolla tube slender, incurved, the limb oblique, the lobes spreading and subequal; stamens 2, included; staminodes 2; capsules ovate or oblong, stipitate; seeds 4.—A genus consisting of about 20 species, which are native to eastern India and the Malay Archipelago.

Eranthemum nervosum (Vahl) R. Br. Native to eastern India, but found occasionally both as a cultivated plant and as an escape in tropical regions of America. A shrub, up to 2 meters high; stems quadrangular, glabrous or puberulent; leaf blades oblong-ovate to elliptic, usually 9–12 cm. long (or the lowermost as much as 20 cm. long), 4–5 cm. wide, acuminate, rounded or abruptly narrowed at the base and decurrent on the petiole, entire, glabrous beneath, except the costa and lateral nerves, these prominent and minutely puberulent, both surfaces bearing numerous inconspicuous cystoliths; petioles 1–1.5 cm. long; flowers borne in numerous axillary spikes up to 6 cm. long or more, the bracts closely imbricate, elliptic, 1–1.5 cm. long, whitish, strongly veined; corolla about 2 cm. long, blue, 5-lobed, the tube slender, the limb about 1.5 cm. broad.

GLOCKERIA Nees

Herbaceous or shrubby plants; flowers usually borne in terminal and axillary, thyrsiform panicles; bracts small, subulate; calyx segments 5, narrow, equal; corollas red or yellow, tubular, narrow, usually constricted just above the ovary, thence abruptly and somewhat obliquely enlarged and oblong, often slightly constricted at the mouth, the upper lip narrow, erect, entire, the lower scarcely distinct from the tube, minutely 3-lobed; stamens 2, attached at the top of the tube, exserted, the anthers 1-celled, obtuse; capsules clavate, glabrous, 4-seeded; seeds compressed, roughened.—Several species other than the four described here occur in Mexico and South America.

Leaf blades rounded or subcordate at the base.
  Corolla 2.5 cm. long; leaf blades densely pilose......*G. ventricosa.*
  Corolla 1.2 cm. long; leaf blades glabrous or sparingly pilose. *G. sessilifolia.*
Leaf blades narrowed and decurrent on the petiole at the base.
  Inflorescence open, its branches relatively few, strict, erect or ascending......................................*G. stricta.*
  Inflorescence compact, its branches very numerous, spreading. *G. blepharorhachis.*

Glockeria blepharorhachis (Lindau) Leonard, comb. nov. *Kolobochilus blepharorhachis* Lindau in Pittier, Prim. 2: 309. 1900. Type from Costa Rica or Panama, *Warscewicz.* Wet forests. Endemic. Herbaceous or suffruticose, up to 1.5 meters high; stems terete, glabrous below, the upper portions subtomentose with brownish hairs about 1 mm. long; leaf blades ovate, elliptic, or oblong, up to 22 cm. long and 9.5 cm. wide, acuminate, narrowed at the base, entire or crenate, the younger ones pilose, the older ones glabrous except as to costa and veins; petioles up to 5 cm. long, pilose; flowers numerous, borne in a compact, elongate thyrse up to 30 cm. long or more and 3–6 cm. in diameter, the branches slender and fascicled, spreading, the rachis densely pilose or subtomentose (hairs brownish, about 1 mm. long), the peduncles pubescent with hairs 0.5 mm. long; pedicels slender, up to 4 mm. long, minutely pubescent; bracts lanceolate, the lowermost leaflike, the others diminishing successively toward the tip; bractlets similar but smaller; calyx 8–10 mm. long, puberulent, the minute hairs intermixed with longer (0.5 mm.), glandular ones, the segments narrowly linear, 0.5–1 mm. wide; corollas red to orange-yellow, 15 mm. long, glabrous without, pilosulous within, the lower portion of the tube about 2 mm. in diameter, enlarged to 6 mm. above the ovary, the mouth scarcely contracted, the upper lip erect, 5–7 mm. long, 3–4 mm. wide, entire, the lower lip scarcely distinct from the tube, the lobes 1–2 mm. long; stamens barely exserted; capsules 15 mm. long, 3 mm. wide; seeds flat, 2 mm. in diameter, roughened.

Glockeria sessilifolia Oerst. Vid. Medd. Kjoebenhavn 1854: 141. 1855. Volcán de Barba, 1,800 meters, *Oersted.* Found on the wooded, southern slopes of Poás and Barba. Herbaceous or suffrutescent, up to 2 meters high; stems branching, glabrous below, the tips quadrangular, glabrous or puberulous in 2 lines; leaf blades ovate, up to 6 cm. long or more and 5.5 cm. wide, obtuse or short-acuminate, the tip blunt, rounded or subcordate at the base, glabrous or sparingly pilose; petioles up to 4 mm. long; flowers borne in a lax, terminal panicle up to 15 cm. long and 12 cm. in diameter, sometimes with smaller additional axillary panicles, the branches opposite, spreading, slender, glabrous or sparingly pubescent; pedicels about 1 mm. long; bracts narrowly triangular, up to 1.5 mm. long; calyx segments linear-subulate, 4 mm. long, sparingly glandular-pubescent, the hairs about 0.5 mm. long; corolla 1.2 cm. long, glabrous, red and yellow, the narrow basal portion of the tube 2.5 mm. long and 1 mm. in diameter, the upper portion enlarged to 3–4 mm., thence gradually narrowed to 2.5 mm. at the mouth, the upper lip spatulate, acute, 1 mm. wide at the base, 0.5 mm. wide near the tip, the lower lip short, recurved, about 3 mm. long and broad, the lobes 0.5 mm. long, 1 mm. wide, rounded; stamens barely exserted; capsule 12–13 mm. long; seeds flat, hispidulous.

Glockeria stricta Leonard, sp. nov.—Herba erecta, caulibus superne pubescentibus, pilis flavescentibus, retrorsis, inferne glabris; lamina foliorum oblongo-elliptica, breviter acuminata, basi angustata, membranacea, glabra, costa et venis strigosis exceptis; petioli graciles, canalibus appresso-pubescentibus; inflorescentiae racemosae, racemis terminalibus et axillaribus, simplicibus vel ramosis, vel saepe paniculatae; rhachis puberulenta, pilis curvatis, interdum glanduliferis et patulis; bracteae anguste triangulares vel lanceolatae, puberulentae; calycis segmenta anguste linearia vel subulata, puberulenta, interdum pilis patulis glanduliferis instructa; corolla rubra et lutea, labio superiore ovato, obtusiusculo, inferiore trilobo; capsulae glabrae vel apice parce pubescentes, stipitatae; semina plana, muricata.

An erect herb, up to 1.5 meters high; stems glabrous below, puberulent above with yellowish, retrorsely curved hairs, these scattered or arranged in 2 lines; leaf blades oblong-elliptic, up to 12 cm. long and 5 cm. wide, short-acuminate (the tip blunt), narrowed at the base, thin, glabrous except the costa, veins, and margins, these minutely strigose; petioles slender, up to 3 cm. long, glabrous below, the channels appressed-pubescent; flowers borne in terminal and axillary racemes, these erect or ascending, simple or often branched and forming a large, terminal panicle, the flowers approximate or distant, the internodes up to 1.5 cm. long, the rachis puberulent, or the minute hairs sometimes intermixed with long (0.5–1 mm.), glandular, spreading ones, the pedicels slender, 2–3 mm. long, puberulent; bracts narrowly triangular or lanceolate, 2–3.5 mm. long, about 1 mm. wide, puberulent; calyx segments narrowly linear or subulate, 5–7 mm. long, 0.5–0.75 mm. wide, puberulent, often with additional scattered, spreading, glandular hairs up to 1 mm. long; corolla red and yellow, 1.5 cm. long, the narrow basal portion of the tube 3 mm. long and 1.5 mm. in diameter, thence abruptly and somewhat obliquely enlarged to 5 mm., then gradually narrowed to 4 mm. at the mouth, the upper portion of the tube sparingly pubescent, the upper lip ovate, 3 mm. long, 2.5 mm. wide at the base, obtusish, the lobes of the lower lip 0.5 mm. long and 0.75 mm. wide; capsules 13 mm. long, 2.5 mm. wide, glabrous or sparingly pubescent toward the tip, 4-seeded, stipitate; seeds flat, muricate.—Moist forest, vicinity of Santa María de Dota, Prov. San José, 1,500–1,800 meters, December 26, 1925–January 3, 1926, *Standley & Valerio 43311* (type in U. S. Nat. Herb., No. 1,253,199), *43225*, *43301*. Moist forests of Cerro de La Carpintera, Prov. Cartago, 1,500–1,850 meters, *Standley 34212*. San Antonio, *Brenes 3766*. Vara Blanca de Sarapiquí, north slope of Central Cordillera, between Poás and Barba volcanoes, *Skutch 3577*. Wet forests of Viento Fresco, Prov. Alajuela, 1,600–1,900 meters, *Standley & Torres 47769, 47848, 47858*. Well marked by its strict inflorescence and glandular-pilose rachis and calyx.

Glockeria ventricosa Donn. Smith, Bot. Gaz. 27: 439. 1899. Alto del Roble, Volcán de Barba, 2,600 meters, *Pittier 3519*. Slopes of Alto del Roble, Volcán de Turrialba, Cerro Gallito, and Vara Blanca de Sarapiquí. Endemic. Shrubby, the branches terete, subtomentose, the hairs about 1 mm. long; leaf blades ovate to oblong-ovate, up to 17 cm. long and 9.5 cm. wide, acuminate, rounded or subcordate at the base, both surfaces densely pilose; petioles up to 8 cm. long, pilose; flowers numerous, borne in a compact, elongate thyrse up to 50 cm. long, the rachis and branches puberulent; pedicels slender, up to 2.5 cm. long, puberulent, some of the hairs glandular; bracts oblong to lanceolate, acutish to acuminate, up to 13 mm. long and 4 mm. wide, subglabrous; calyx 7 mm. long, becoming 13 mm. long at fruiting stage, glandular-pubescent, the segments linear; corolla 2.5 cm. long, orange, sparingly pilose, the tube about 4 mm. in diameter at the base, contracted to 3 mm. above the ovary, thence abruptly enlarged to 5 mm., incurved, scarcely constricted at the mouth, the posterior lip elliptic, 8–10 mm. long, 4–5 mm. wide, entire, the lobes of the lower lip 1.5 mm. long; stamens exserted; capsules 15–17 mm. long.

GRAPTOPHYLLUM Nees

Shrubs; leaf blades usually entire, colored; flowers clustered either in a terminal thyrse or in the axils of the leaves; calyx segments

5; corollas reddish purple, ringent, the tube inflated above, the upper lip with 2 short, recurved lobes, the lower lip 3-parted; stamens 2.—The genus consists of 5 or more species, all oriental. The name is from the Greek, referring to the variegated foliage.

Graptophyllum pictum (L.) Griff. Cultivated in gardens of tropical America. Shrubs, up to 3 meters high; stems glabrous; leaf blades ovate to elliptic, up to 20 cm. long and 9 cm. wide, acuminate, narrowed at the base, glabrous, mottled with yellow along the midrib; flowers borne in terminal racemes, the rachis glabrous or sparingly puberulent; corollas up to 8 cm. long, purplish red, glabrous without, glandular-puberulent within, the mouth about 1.5 cm. broad; stamens 2, exserted; staminodes 2.

HABRACANTHUS Nees

Herbaceous or shrubby plants; leaves usually thin, ovate to lanceolate; flowers borne in terminal panicles; bracts and bractlets minute; calyx deeply 5-parted, the segments equal; corolla tubular, ringent, the lips elongate, ligulate, the upper one entire, the lower one minutely 3-lobed at the apex; stamens 2, attached at the top of the tube, exserted; anthers 1-celled, attached to the filament below the middle; capsules 4-seeded, the basal half slender, solid.—Represented in Central America and Mexico by a single species. Other species have been described from South America.

Habracanthus silvaticus Nees. Wet forests and clearings of the central cordillera. Originally described from Chiapas, Mexico. Herbs or slender shrubs, up to 2 meters high, the branches terete, glabrous, or puberulent in 2 lines with retrorsely curved hairs; leaf blades oblong-ovate to lanceolate, 5–18 cm. long, 1.5–6 cm. wide, acuminate, the tip rounded or obtuse (sometimes slightly falcate), narrowed at the base, thin, entire or undulate, glabrous or the costa and lateral veins pubescent with minute, curved hairs, both surfaces usually bearing minute cystoliths; petioles up to 7 cm. long (usually shorter), glabrous beneath, the channeled upper portion puberulent with curved hairs; flowers borne in loose, terminal thyrses usually 5–8 cm. long and 4–5 cm. broad, the lower portion of the thyrse 2–3 times dichotomously branched, the entire inflorescence essentially glabrous; bracts subulate, the lowermost 3–6 mm. long, about 1 mm. wide at the base, sometimes bearing several minute hairs, the others similar but successively smaller toward the tip of the flower cluster; peduncles 2–3 cm. long; branches of the thyrse widely spreading; pedicels 5 mm. long or less; rachis and calyx whitish or lavender, the calyx lobes subulate, 3–4 mm. long; corolla 1–1.5 cm. long, pale purple or lavender, the tube slender, 1 mm. in diameter at the base, 1.5 mm. at the mouth, the lips 1 cm. long, delicately nerved, the upper oblong, 2 mm. wide, rounded at the tip, the lower elliptic, 5 mm. wide, the lobes about 0.5 mm. long, the middle of these 1 mm. wide, the lateral about 0.5 mm. wide; filaments about as long as the lips of the corolla; capsules 1.5 cm. long, 2.5 mm. in diameter; seeds flat, brownish, about 2 mm. in diameter, minutely roughened and puberulent.

HANSTEINIA Oerst.

Herbaceous or suffrutescent plants; flowers borne in lax, terminal, dichotomously branched panicles and in axillary spikes; calyx segments 4, the superior ones narrowly linear, the others lanceolate, subequal; corolla tubular, the limb short, the upper lip narrow, entire, the lower 3-lobed; stamens 2, short, included; anthers 1-celled; capsule 4-seeded.

Hansteinia gracilis Oerst. Vid. Medd. Kjoebenhavn 1854: 143. 1855. Dense, damp woods on Mt. Jaris, *Oersted.* The following description is adapted from the original. Suffrutescent, 60 cm. high; stems erect, slender, simple or sparingly branched, subtetragonal, pubescent; leaf blades elliptic-ovate, up to 20 cm. long and 8 cm. wide, acuminate, the tip blunt, narrowed at the base and decurrent on the petiole, subrepand-crenate, glabrous except on the costa and veins, these minutely strigose; flowers fascicled at the tips of the branches of a terminal panicle (up to 15 cm. long), the rachises glandular, ferruginous-pubescent; calyx segments red, 6–8 mm. long, or reaching 1.5 cm. at the fruiting stage, glandular-villous; corolla 15–17 mm. long, red, tomentose; capsule 8–10 mm. long, puberulent.

HYGROPHILA R. Br.

Herbs; leaves entire, often with cystoliths; flowers sessile, fascicled or solitary, borne in the axils of the leaves; calyx 5-parted, the segments narrow, nearly similar; corolla tube subcylindric, the limb strongly 2-lipped, the upper lip 2-lobed, the lower 3-lobed, the lobes sinistrorsely contorted; stamens 4, didynamous; anthers 2-celled, their lobes unappendaged.—Many species occur in tropical regions of both hemispheres.

Hygrophila guianensis Nees. *H. conferta* Nees. Marshy places, usually along streams. Mexico to northern South America and West Indies. A branched herb, up to 50 cm. high, sparingly hirtellous or glabrate, the stem obtusely quadrangular; leaf blades lanceolate, 5–15 cm. long, 0.5–3 cm. wide, acuminate at both ends, entire; flowers fascicled; calyx segments lanceolate, about 5 mm. long, white-margined, pilose; corolla white or purplish, puberulent, the tube 5 mm. long, the lips about 2.5 mm. long; capsules narrowly oblong, 1.2–1.4 cm. long, glabrous, 16–18-seeded.

JACOBINIA Moric.

Herbs or shrubs; leaves usually oblong to ovate, entire (rarely crenate), petioled; flowers sessile or short-pedicellate in the axils of the bracts, solitary, cymose, spicate, or paniculate; calyx 5-parted, the segments narrow; corolla usually red or yellow, the tube usually slender and elongate, straight or curved, the limb 2-lipped, the upper lip narrow, erect, entire or minutely 2-lobed, the lower lip 3-lobed; stamens 2, the anther cells more or less unequally attached, muticous to acute or subcalcarate at the base; staminodes none; capsules clavate, 4-seeded.—A rather large genus of shrubs or subshrubs, distributed throughout tropical America. Often cultivated in gardens or, in temperate regions, in greenhouses.

Flowers borne in a large, dense, terminal thyrse.........*J. umbrosa.*
Flowers borne in terminal or axillary cymes, panicles, or spikes.
  Leaves crenate; branches of the inflorescence puberulent. *J. crenata.*
  Leaves entire; branches of the inflorescence glabrous or subglabrous.
    Corollas 5–6 cm. long..........................*J. macrantha.*
    Corollas 3–3.5 cm. long........................*J. tinctoria.*

Jacobinia crenata Leonard, sp. nov.—Frutex, caulibus teretibus, glabris; lamina foliorum ovato-oblonga ad oblonga, acuminata, basi angustata, membranacea, glabra; petioli glabri; spicae breves, laxae, paniculatae, rhachibus puberulentis; bracteae oblongo-ovatae, apice rotundatae, sparse glanduloso-pubescentes, vel infimae foliosae et glabrae; calycis segmenta linearia, sparse puberulenta, minute ciliolata, interdum pilis raris longioribus glanduliferis instructa; corolla rubra et flava, tenuiter pubescens, labiis angustis; antherae loculi inaequaliter affixi, inferior basi subcalcaratus; capsulae clavatae, glabrae vel apice pilos paucos glanduliferos gerentes.

A shrub, up to 2 meters high; stems terete, glabrous; leaf blades ovate-oblong to oblong, up to 24 cm. long and 10 cm. wide, acuminate (the tip blunt), narrowed at the base, thin, crenate, glabrous, with numerous minute cystoliths; petioles up to 8 cm. long, glabrous;

flowers borne in lax spikes up to 8 cm. long, these forming large, terminal panicles up to 30 cm. long, the branches of the panicles and the rachises puberulent; bracts oblong-ovate, 5 mm. long and 3 mm. wide, rounded at the apex, sparingly glandular-pubescent, or the lowermost larger, leaflike, and glabrous, all but the uppermost soon deciduous; bractlets similar but smaller; calyx segments linear, about 7 mm. long, less than 1 mm. wide, sparingly puberulent, minutely ciliolate, sometimes with scattered, glandular hairs up to 0.25 mm. long; corollas 4.5–6 cm. long, finely pubescent, red and yellow, the tube slender, 1–3.5 mm. in diameter at the base, narrowed above the ovary, 4–6 mm. at the mouth, the lips narrow, 6 mm. wide or less, up to 2 cm. long, gradually narrowed from base to tip, the lobes about 0.5 mm. long, rounded; anther lobes unequally attached, about 3 mm. long, the lower subcalcarate; capsules 1.5 cm. long, clavate, glabrous or with a few glandular hairs near the tip.—La Concepción, Llanuras de Santa Clara, 250 meters, February, 1896, *Donnell Smith 6691* (type in U. S. Nat. Herb., No. 355,229). Buena Vista, road to San Carlos Valley, 600 meters, *Cook & Doyle 148*. Wet forests in the vicinity of Guápiles, Prov. Limón, 300–500 meters, *Standley 37286, 37354*. Wet forest, Pejivalle, Prov. Cartago, 900 meters, *Standley & Valerio 46991, 47107*. Cataratas de San Ramón, *Brenes 4422, 13412*. Forests between Río Chirripó and Río Zent, 2,500 meters, *Pittier 16052*. Río de Las Vueltas, 635 meters, *Tonduz 12887*. Río Hondo, 50 meters, *Pittier 16642*. Zarcero, *A. Smith A222, H39*. Easily distinguished among Costa Rican species by its large, crenate leaves, its large, terminal panicles of short spikes, and its rounded bracts.

Jacobinia macrantha (Benth.) Hemsl. *Pata de gallo, Sacatinta, Azul. Justicia macrantha* Benth. *Cyrtanthera macrantha* Nees. *Cyrtantherella macrantha* Oerst. Moist forests of Central America. Slender shrubs, up to 4 meters high, often resting on other plants; stems subtetragonal, pilose at the nodes or glabrous, rarely densely pilose; leaf blades ovate to oblong, up to 20 cm. long and 6 cm. wide, acuminate (the tip blunt), narrowed at the base, thin, glabrous; petioles up to 2 cm. long, glabrous or pilose above; flowers borne in axillary cymes; peduncles (up to 4 cm. long) and pedicels glabrous; bracts and bractlets subulate, up to 2 mm. long, glabrous; calyx 6–7 mm. long, the segments lance-subulate, ciliolate; corollas pale yellowish or orange-red, up to 6.5 cm. long, glabrous, the tube slender, 1.5 mm. in diameter at the base, 5 mm. at the mouth, the lips about 2.5 cm. long, the posterior lip acute and bidentate, provided with 2 medial wings enclosing a portion of the style, the anterior lip spreading, about 1 cm. wide, the lobes about 2 mm. long, rounded; stamens exserted from the mouth of corolla, the anthers curved, converging at the tip and diverging at the base. The flowers are said to resemble the open mouth of a serpent.

Jacobinia tinctoria (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 522. 1882. *Azul, Sacatinta, Azul de mata. Sericographis tinctoria* Oerst. Vid. Medd. Kjoebenhavn 1854: 150. 1855. Cartago, *Oersted.* Dry thickets of Central America. Glabrous shrubs, up to 2 meters high; stems terete; leaf blades lanceolate to oblong-lanceolate, up to 8 cm. long and 2.5 cm. wide, acuminate (the tip blunt), narrowed at the base; petioles up to 1 cm. long; flowers secund, borne in lax, curved, glabrous, axillary spikes up to 5 cm. long; bracts and bractlets triangular-subulate, up to 2 mm. long and 1 mm. wide at the base; calyx segments triangular-subulate, 1.5–2.5 mm. long, about 1 mm. wide at the base, ciliolate; corolla 3–3.5 cm. long, red, the tube slender, 1.5 mm. in diameter at the base, 4 mm. at the mouth, the lips oblong, 1.5 cm. long, 5 mm. wide, the upper acute, minutely bidentate, the lobes of the lower lip about 1 mm. long, rounded, the middle one 2 mm. wide, the lateral ones 1.5 mm. wide; anther lobes 3 mm. long, unequally and obliquely attached, the upper acute, the lower subcalcarate at the base. The leaves, treated with hot water, give a blue solution used by laundresses to give a blue tint to white clothes. This color changes to red with acids like litmus (*Standley*). Pittier reports the Brunka name as Tebi-ká.

Jacobinia umbrosa (Benth.) Blake. *Pavón amarillo, Pavón, Pavoncillo.* Synonyms of *J. umbrosa* are *Justicia aurea* Schlecht. and *Jacobinia aurea* Hemsl., non Hiern. Damp woods, southern Mexico and Central America. Often cultivated in gardens. A shrub or small tree, up to 5 meters high or more; branches puberulent or glabrous; leaf blades lance-oblong to broadly ovate, 10–45 cm. long, up to 12 cm. wide or more, acute or acuminate, abruptly decurrent at the base, glabrous or puberulent; petioles 5–8 cm. long; inflorescence a many-flowered thyrse 7–30 cm. long, the rachises puberulent; bracts linear-lanceolate, 1–2 cm. long, about 2 mm. wide, 1-nerved, puberulent; calyx segments 5, lanceolate, 7 mm. long, 1.5 mm. wide, puberulent, 3-nerved; corolla 4.5–5 cm. long, yellow or reddish yellow, puberulent or pilosulous, the lips 2.5 cm. long, the upper one narrow, erect, entire, the lower 3-lobed, the lobes 2 mm. long, rounded; anthers 3 mm. long, the cells slightly unequal, abruptly acute at the base, the tip minute; capsules 16–17 mm. long, clavate, puberulent.

JUSTICIA L.

Herbs or shrubs; leaves petiolate, usually ovate, entire; flowers spicate, paniculate, or solitary; bracts small, or occasionally large and imbricate; calyx segments narrow, nearly equal; corollas usually purple, pink, or white, sometimes with dark purple markings, the tube usually short, the throat ampliate, the upper lip 2-lobed, the lower 3-lobed; stamens 2; anther cells 2, unequally attached, acute or calcarate; staminodes none; ovules 2 in each cavity; capsules oblong to obovate.—A large, cosmopolitan genus.

Leaves of a pair unequal . . . . *J. trichotoma.*
Leaves of a pair equal.
  Calyx segments 4; leaf blades metallic blue beneath . . *J. metallica.*
  Calyx segments 5.
    Calyx segments unequal, the posterior one much smaller than the others.
      Corolla 2.5 cm. long or more . . . . *J. Oerstedii.*
      Corolla 1 cm. long or less.
        Bracts oblong or oblong-lanceolate.
          Leaves firm; stem densely yellowish-pilose . . . *J. Skutchii.*
          Leaves thin; stems finely pubescent in 2 lines. *J. angustibracteata.*
        Bracts elliptic or ovate.
          Stems pilose in 2 lines . . . . *J. Pittieri.*
          Stems not pilose in 2 lines, the hairs more or less evenly distributed.
            Hairs of the stem spreading, up to 1 mm. long. *J. candelariae.*
            Hairs of the stem curved, minute . . . . *J. Valerii.*
    Calyx segments equal (the posterior one slightly smaller than the others in *J. pectoralis*).
      Bracts and bractlets narrowly spatulate . . . . *J. costaricana.*
      Bracts and bractlets various, not narrowly spatulate.
        Corollas 25–30 mm. long . . . . *J. carthaginensis.*
        Corollas 20 mm. long or less.
          Bracts subulate, minute, 3 mm. long or less.
            Corollas 8–15 mm. long . . . . *J. pectoralis.*

Corollas about 6 mm. long................*J. comata.*

Bracts lanceolate to ovate, mostly more than 4 mm. long.

Leaf blades pilose, the hairs up to 3 mm. long. *J. Tonduzii.*

Leaf blades glabrous or minutely and sparingly pilose beneath.

Leaf blades rather small, 7 cm. long or less. *J. parvibracteata.*

Leaf blades large, 20 cm. long or more.

Bracts ovate, ciliate..............*J. refractifolia.*

Bracts lanceolate, eciliate............*J. refulgens.*

Justicia angustibracteata Leonard, nom. nov. *Rhytiglossa microphylla* Oerst. Vid. Medd. Kjoebenhavn 1854: 159. 1855, non *Justicia microphylla* Lam. 1791. Mountains of Candelaria, 1,800–2,100 meters, *Oersted.* Wet forests of the upper mountain slopes. Endemic. Herbs, up to 60 cm. high; stems slender, branched, ascending, subquadrangular, finely pubescent in 2 lines; leaf blades oblong-ovate to lanceolate, up to 11 cm. long and 3 cm. wide, obtuse to acuminate, the tip blunt, narrowed at the base, thin, sparingly hirtellous above, more densely so beneath; petioles up to 1 cm. long, hirtellous; flowers borne in terminal, peduncled, solitary or paired spikes (one much smaller than the other) up to 8 cm. long and 1 cm. in diameter, the rachis and peduncle densely hirtellous; bracts oblong to oblanceolate, up to 1 cm. long and 2 mm. wide, acute to obtusish at the apex, hirtellous and ciliate; bractlets up to 1 cm. long and 0.5 mm. wide, hirtellous and ciliate; calyx 6–7 mm. long, the segments 5, subulate, ciliate, the posterior segment much smaller than the others; corollas 1 cm. long, 1.5 mm. wide at the base, 2.5 mm. at the mouth, puberulent, white(?); capsules clavate, 8 mm. long, sparingly puberulent.

Justicia candelariae (Oerst.) Leonard, Carnegie Inst. Wash. Publ. 461: 231. 1936. *Rhytiglossa candelariae* Oerst. Vid. Medd. Kjoebenhavn 1854: 158. 1855. *Dianthera candelariae* Hemsl. Biol. Centr. Amer. Bot. 2: 517. 1882. Mountains of Candelaria, 1,800–2,100 meters, *Oersted.* Wet, wooded mountain slopes (usually above 600 meters). Herbs, up to 45 cm. high; stems branching, decumbent, terete, hirsute, the hairs about 1 mm. long; leaf blades ovate to oblong, up to 7 cm. long and 3 cm. wide, but usually much smaller, obtuse to acute, with blunt tip, narrowed at the base, hirsute, paler beneath;

petioles up to 1 cm. long, pilose; flowers borne in terminal, solitary or paired, bracted spikes (one spike much smaller than the other) up to 4 cm. long and 1 cm. in diameter, the rachis pilose, the bracts imbricate, elliptic, up to 1 cm. long and 6 mm. wide, rounded and mucronulate at the apex, rounded or narrowed at the base, submembranaceous, nitid, subreticulate, hirsute and ciliate; bractlets lanceolate, about 8 mm. long and 2 mm. wide, in other respects similar to the bracts; lateral and anterior calyx segments linear, 6 mm. long and 0.5 mm. wide, the posterior one subulate, 4 mm. long, all ciliate; corollas 8 mm. long, white or tinged with violet, puberulent toward the tip, 2 mm. in diameter at the base, 2.5 mm. at the mouth, the upper lip 4 mm. long, the lower 5 mm.; capsules 8 mm. long, clavate, puberulent. In the publication of the original transfer the author was erroneously given as Hemsley.

Justicia carthaginensis Jacq. Thickets in both moist and dry situations. Found throughout the West Indies and tropical continental America. Herbaceous or suffrutescent, up to 1.5 meters high; stems erect, branched, pilosulous in 2 lines or glabrous; leaf blades ovate or elliptic-ovate, 5–12 cm. long, acuminate, narrowed or rounded at the base and decurrent on the petiole, glabrous or pilosulous; petioles 0.5–2 cm. long; flowers borne in dense, terminal, bracted spikes 3–7 cm. long; bracts oblong, 15 mm. long or less, about 5 mm. wide, acute or obtuse, the bractlets similar but narrower, all pilosulous, some of the hairs glandular; calyx segments 5, linear-lanceolate, 10–11 mm. long, white-margined, ciliolate toward the tip; corollas purple, 2.5–3 cm. long, sparingly glandular-pubescent, the tube about 1.5 cm. long, the upper lip straight, about as long as the tube, notched at the apex, the lower lip spreading, slightly longer than the upper, 3-lobed, the lobes elliptic, about 1 cm. long, rounded; capsules 1.5–2 cm. long, finely puberulent.

Justicia comata (L.) Lam. Damp thickets and woods, usually on banks of streams. West Indies and tropical continental America. An herb, up to 20 cm. high; stems weak, ascending or nearly erect, usually branched, often rooting at the lower nodes, glabrous or sparingly pilosulous; leaves sessile or petioled, the blades lanceolate to oblong-ovate or oblong, 3–15 cm. long, acuminate or acute, rounded or narrowed at the base; petioles, when present, up to 2 cm. long; flowers borne in axillary and terminal, peduncled panicles up to 22 cm. long, the branches nearly filiform, 2–7 cm. long, often forming verticillasters, more or less glandular-pubescent; bracts and bractlets subulate, 3 mm. long or less; calyx segments 5, subulate, 1.5–2 mm. long; corollas white or purplish, about 6 mm. long, the tube relatively broad, 2 mm. long, the upper lip erect, 3 mm. long, emarginate, the lower lip 4–5 mm. long, 3-lobed, the lobes rounded, 1 mm. long; capsules 4–5 mm. long, stipitate, puberulent, sometimes glabrous when mature.

Justicia costaricana Leonard, sp. nov.—Suffrutescens, caulibus parce ramosis, subteretibus, glabris vel apice bifariam pubescentibus; lamina foliorum oblongo-ovata, acuminata, basi angustata, glabra, perspicue cystolithigera; petioli glabri; spicae axillares, solitariae vel geminae, simplices vel interdum basi ramosae, rhachibus et pedunculis glanduloso-puberulentis; bracteae spathulatae, unguiculatae, parce glanduloso-puberulentae; bracteolae anguste lineari-spathulatae, glanduloso-puberulentae, saepe patentes; calycis segmenta lanceolato-subulata, puberulenta; corolla virescenti-flava, fauce atrorubra, tubo basi ventrali bisaccato; antherae loculi oblique et inaequaliter affixi, inferior breviter calcaratus.

Suffrutescent, up to 1.3 meters high; stems sparingly branched, subterete, glabrous or the tips pubescent in 2 lines; leaf blades oblong-ovate, up to 13 cm. long, and 4.5 cm. wide, acuminate (the tip blunt), narrowed at the base, glabrous, the cystoliths numerous and conspicuous; petioles up to 2 cm. long, glabrous; flowers borne in axillary spikes up to 3 cm. long, or occasionally longer, these solitary, paired, simple or sometimes branched at the base, the rachises and peduncles (5–10 mm. long) glandular-puberulent (sometimes in 2 lines); bracts spatulate, 1 cm. long, 3–5 mm. wide, unguiculate, sparingly glandular-puberulent; bractlets linear-spatulate, 1 cm. long, 0.5 mm. wide, glandular-puberulent; bracts and bractlets usually spreading; calyx segments 5, lance-subulate, 5.5 mm. long, 1.5 mm. wide at the base, puberulent; corollas 10 mm. long, greenish white, tinged with dark red in the throat, the tube short, 1.5 mm. in diameter at the base, enlarged to 3 mm. and narrowed again above the ovary, about 4 mm. at the mouth, the ventral basal portion of the tube with 2 saccate projections, the lips 4.5 mm. long, the upper one about 5 mm. wide at the base, bidentate at the apex, the lobes of the lower lip rounded, the middle one 3 mm. wide, the lateral 2 mm. wide; anthers obliquely and unequally attached, the upper apiculate at the base, the lower short-spurred (0.5 mm. long).—Moist forests of El Muñeco, Río Navarro, Prov. Cartago, 1,400–1,500 meters, March 6–7, 1926, *Standley & Torres 51257* (type in U. S. Nat. Herb., No. 1,306,691), *50960, 50976, 51237; Standley 33429, 33453.* Cataratas de San

Ramón, *Brenes 13488*. Wet forests of La Hondura, Prov. San José, 1,300–1,700 meters, *Standley 36539, 37735, 37956*. La Brisa de Zarcero, *A. Smith H396*. Easily recognized by its spreading, spatulate bracts and greenish white, red-throated, saccate corollas.

Justicia metallica Lindau in Pittier, Prim. 2: 311. 1900. Forests of El General, 600 meters, *Pittier 3497*. Found in the forests of El General, Térraba, and Cañas Gordas. Also in the Changuinola Valley, Panama. Herbs, up to 40 cm. high; stems ascending, rooting at the lower nodes, subquadrangular, pilosulous in 2 lines, purplish; leaf blades ovate, up to 8 cm. long and 4 cm. wide, more or less acuminate (the tip blunt), rounded at the base and slightly decurrent on the petiole, glabrous or the costa and veins hirsute with curved hairs, the lower surface of a shining, metallic purple; petioles up to 7 mm. long, hirsutulous above; flowers secund in terminal or axillary, glandular-pilosulous panicles composed of lax spikes; bracts and bractlets minute; calyx segments 4 and 4 mm. long, 1 mm. wide; corollas purple(?), finely pubescent, the tube slender, 8 mm. long, the upper lip 4.5 mm. long, minutely 2-dentate at the apex, the lower lip 4 mm. long, the lobes small, obtuse; capsules 8 mm. long, glabrous, slender-stipitate.

Justicia Oerstedii Leonard, nom. nov. *Chiloglossa glabra* Oerst. Vid. Medd. Kjoebenhavn 1854: 161. 1855. *Dianthera glabra* Hemsl. Biol. Centr. Amer. Bot. 2: 518. 1882. *Justicia glabra* Lindau in Pittier, Prim. 2: 312. 1900, non Koen. ex Roxb., 1820. Candelaria, 1,500 meters, *Oersted*. Found in damp thickets and forests, usually above 500 meters; also in the Chiriquí region of Panama. Slender, suffrutescent plants, rarely over 2 meters high, erect or suberect, the branches terete, retrorsely hirsutulous in 2 lines; leaf blades oblong to lanceolate, up to 7 cm. long and 3 cm. wide (occasionally larger), obtuse to acuminate, narrowed at the base, glabrous; petioles up to 1.5 cm. long but usually much shorter; flowers borne in lax, terminal panicles, the branches glandular-puberulent; bracts and bractlets minute, subulate; calyx up to 6 mm. long, the segments linear, puberulent, the posterior one much smaller than the others; corolla bright red, up to 3 cm. long, finely and sparingly pubescent, the tube narrow, 1 mm. in diameter at the base, gradually enlarged to 5 mm. at the mouth, the upper lip oblong, 1 cm. long, 5 mm. wide, minutely bidentate at the apex, the lower lip slightly longer than the upper, the middle lobe 2.5 mm. wide, the lateral one 1.5 mm. wide, all 3 mm. long and rounded at the apex; stamens barely reaching the tip of the lips, the connective about 1 mm. broad; anther cells attached one slightly above the other, the lower one rounded, acutish at the base; ovary glabrous.

Justicia parvibracteata Leonard, sp. nov.—Herbae erectae vel adscendentes, caulibus teretibus, bifariam retrorso-pubescentibus; lamina foliorum oblongo-lanceolata, acuminata, basi angustata, glabra; petioli glabri; inflorescentia spicata vel paniculata, rhachibus et pedunculis patente pubescentibus, interdum glanduliferis, floribus 2–4 in axillis bractearum; bracteae oblongae, obtusae, basi angustatae, chartaceae, glabrae, venosae; bracteolae lanceolatae, glabrae vel parce pubescentes; calycis segmenta lanceolata, minute pubescentia; corolla alba et purpurea, parce pubescens, tubo subcylindrico, labiis subaequalibus, superiore oblongo-ovato, acuto et minute bidentato, inferiore trilobo, lobis rotundatis; antherae loculi subaequaliter affixi, inferior basi acutiusculus.

Erect or ascending herbs up to 1 meter high; stems terete, retrorsely pubescent in 2 lines; leaf blades oblong-lanceolate, up to 7 cm. long and 2.5 cm. wide, acuminate (the tip blunt), narrowed at the base, glabrous, with cystoliths; petioles up to 5 mm. long, glabrous; inflorescence spicate or subpaniculate, up to 10 cm. long, the rachises and peduncles (up to 3 cm. long) spreading-pubescent, the hairs about 0.5 mm. long, some of them gland-tipped, the internodes about 5 mm. long; flowers 2–4 in the axils of the bracts; pedicels 1 mm. long; bracts oblong, 4 mm. long, 1 mm. wide or slightly wider, obtuse at the apex, narrowed at the base, firm, glabrous, the veins prominent; bractlets lanceolate, 1–2.5 mm. long, 0.5 mm. wide, glabrous or sparingly pubescent, the hairs barely 0.5 mm. long, some of them gland-tipped; calyx about 3 mm. long, minutely pubescent, the segments 5, lanceolate, about 0.5 mm. wide, subequal; corollas 7 mm. long, subcylindric, 1.5 mm. in diameter, barely expanded at the mouth, white and purple, sparingly pubescent, the lips subequal, 2.5 mm. long, the upper lip oblong-ovate, 1.5 mm. wide, acute and minutely bidentate at the apex, the lower lip 3 mm. wide, with 3 rounded lobes 1.25 mm. in diameter; anther cells subequally attached, the lowermost slightly larger than the upper and acutish at the base; capsules clavate, 7 mm. long, puberulent, the hairs of the stipe retrorse.—Wet forests in the vicinity of Pejivalle, Prov. Cartago, 900 meters, February, 1926, *Standley & Valerio 47001* (type in U. S. Nat. Herb., No. 1,254,955), *46926*. Closely related to *J. Pittieri*, but with comparatively narrow bracts, strictly glabrous leaf blades, and with glandular, spreading hairs, evenly distributed on the rachis and peduncle.

Justicia pectoralis Jacq. Waste and cultivated regions in continental tropical America and West Indies. An herb, up to 60 cm. high; stems erect, decumbent, or ascending, sparingly branched, often rooting at the lower nodes, short-pilose in 2 lines below, puberulent and more or less glandular above; leaf blades lanceolate to ovate-lanceolate, 2–10 cm. long, acuminate, acute or obtuse at the base, glabrous; petioles 2–12 mm. long; inflorescence a terminal, few–several-branched panicle, the branches slender, alternate, 2–12 cm. long, more or less glandular, the flowers subdistant; bracts and bractlets subulate, up to 3 mm. long; calyx segments 5, subulate, about 2 mm. long, the posterior segment slightly shorter than the others; corollas pink, puberulent, 8–15 mm. long, the tube 5 mm. long, the upper lip straight, about 4 mm. long, minutely 2-lobed at the tip, the lower lip slightly longer, 7 mm. broad, the lobes rounded, 1.5–2 mm. long, purple, white-striped toward the throat.

Justicia Pittieri Lindau in Pittier, Prim. 2: 312. 1900. Known only from the type, collected at Tskuiñak, upper Zhorquín, Talamanca, *Pittier 8642*. An ascending herb, rooting at the lower nodes; stems terete, pilose in 2 lines; leaf blades oblong-lanceolate, 7–10 cm. long, 2–2.5 cm. wide, acuminate, the tip itself blunt, narrowed at the base, glabrous or sparingly pilose beneath, the cystoliths numerous and conspicuous; petioles 5–8 mm. long, pubescent above, the hairs usually curved; spikes simple, terminal, about 5 cm. long, the rachis and peduncle (2 cm. long) pubescent in 2 lines; flowers fascicled in the axils of the bracts, 4–8 at each node, the internodes of the spikes about 5 mm. long; bracts ovate or the lowermost oblong, about 5 mm. long and 2 mm. wide, obtuse at the apex, narrowed and stipitate at the base, ciliate, pilosulous, some of the hairs glandular; bractlets lanceolate, 2.5 mm. long and 1 mm. wide, puberulent; calyx 3–4 mm. long, the anterior segment minute and setulose, the other 4 narrowly lanceolate, 0.5 mm. wide at the base, sparingly and minutely pubescent; corollas sparingly pubescent, purple(?), the tube 5 mm. long and about 1.5 mm. in diameter, the lips 3 mm. long, the upper one 1.5 mm. wide, minutely bidentate at the apex, the 3 lobes of the lower lip about 1 mm. in diameter, obtuse.

Justicia refractifolia (Kuntze) Leonard, comb. nov. *Ecbolium refractifolium* Kuntze, Rev. Gen. 2: 487. 1891. *Justicia pseudopolystachya* Cuf. Archivio Bot. 10: 49. 1934 (Finca Waldeck, Río Madre de

Dios and Río Barbilla, 20–40 meters, *Cufodontis 349* and *652*). Costa Rica, at 300 meters, *Kuntze*. Near sea level, in wet forests of Costa Rica and Panama. Herbs, up to 1 meter high; stems simple, subterete, strigose (the hairs about 0.5 mm. long), or the upper portions hirsute with somewhat longer, spreading hairs; leaf blades oblong-lanceolate, up to 25 cm. long and 10 cm. wide, acute to acuminate (the tip itself usually blunt), narrowed at the base, not at all decurrent, glabrous above, more or less pilose beneath; petioles about 5 mm. long, strigillose; spikes axillary, solitary or paired (one much smaller than the other), up to about 10 cm. long and 1 cm. in diameter; bracts ovate, up to 10 mm. long and 6 mm. wide, acute at the apex, obtusish at the base, glabrous above, sparingly puberulent beneath, ciliate, drying dark brown, the veins prominent, the sterile basal bracts similar but narrower; bractlets lanceolate-falcate, 8 mm. long and about 2 mm. wide, in other respects similar to the bracts; calyx segments 5, subulate, up to 7 mm. long, ciliolate; corollas 10–12 mm. long, purple, finely pubescent; lower anther cells spurred; capsules clavate, 8 mm. long, puberulent, 4-seeded; seeds muricate.

Justicia refulgens Leonard, sp. nov.—Frutex, caulibus subquadrangularibus, glabris vel apice pilosis; lamina foliorum oblonga, acuminata, basi angustata, chartacea, laete viridis, nitens, subtus pallidior, glabra, costa et venis subtus tenuiter et sparse pilosis exceptis; petioli pubescentes; spicae axillares, trifurcatae, pedunculatae, pedunculis glabris vel appresso-pilosis, rhachibus et pedunculis secundariis brunneo-tomentosis; spicae bracteae lineares, floriferae lanceolatae, appresso-pubescentes vel subtomentosae; calycis segmenta linearia, acuminata, tomentosa; corolla tenuiter pubescens, alba, labiis lilacino-tinctis; antherae loculi inaequaliter affixi, inferior minute calcaratus; capsulae clavatae, glabrae; semina plana, brunnea, papillosa.

Shrubs, up to 1 meter high; stems subquadrangular, glabrous or the tips appressed-pilose; leaf blades oblong, up to 25 cm. long and 6 cm. wide, acuminate, narrowed at the base, rather firm, bright shining green, darker above than beneath, glabrous except the costa and veins beneath, these finely and sparingly pilose; petioles up to 4 cm. long, pubescent; flowers borne in trifurcate, axillary, peduncled spikes up to 6 cm. long, the peduncles up to 4 cm. long, subquadrangular, glabrous or appressed-pilose, the rachises and secondary peduncles (1–1.5 cm. long) brownish-tomentose, the lower internodes about 1 cm. long, the others successively shorter toward the tip; bracts subtending the spikes linear, about 2 cm. long and 1.5 cm.

wide, those subtending the flowers lanceolate, 6 mm. long, 1.5–2.5 mm. wide at the base, appressed-pubescent or subtomentose; bractlets similar but narrower; calyx segments 5, linear, 8 mm. long, 1.5 mm. wide, acuminate, tomentose; corollas about 18 mm. long, 6 mm. in diameter at the mouth, finely pubescent, white, the lips tinted lavender, 8 mm. long; anther lobes unequally attached, the lower with a minute spur about 0.25 mm. long at the base; capsules clavate, 2.5 cm. long, 5 mm. wide, glabrous; seeds flat, brown, 4 mm. long, 3.5 mm. wide, papillose.—Between Río Ladrillo and Los Siguas Camp, southern slope of Cerro de La Horqueta, Chiriquí, Panama, 1,200–1,700 meters, March 18, 1911, *Pittier 3272* (type in U. S. Nat. Herb., No. 677,663). Rain forests of Bajo Chorro, Boquete District, Chiriquí, Panama, *Davidson 77*. Well marked by its firm, large, shining, green leaves and its trifurcate, tomentose spikes. Because of the similarity of the Chiriquí Province of Panama to the adjacent region of Costa Rica, it is reasonable to expect an extension of the range of this species to Costa Rica.

Justicia Skutchii Leonard, sp. nov.—Frutex gracilis, caulibus dense flavescenti-pilosis; lamina foliorum oblongo-ovata, acuta, breviter acuminata, vel interdum obtusa, basi rotundata vel subcordata, chartacea, dense flavescenti-pilosa, costa et venis perspicuis; petioli dense pilosi; spicae terminales et axillares, paniculatae, floribus fasciculatis, sessilibus, rhachibus et pedunculis dense flavescenti-pubescentibus, pilis nonnullis glanduliferis; bracteae anguste oblongae, apice obtusae, basi angustatae, supra glabrae, subtus parce pubescentes, venosae; bracteolae lineares, parce hirsutulae; calycis segmentum anticum setulosum, cetera anguste lanceolata, omnia minute pubescentia; corolla tenuiter pubescens, alba et purpurea, labio superiore anguste ovato, acuto, inferiore trilobo, lobis rotundatis; antherae loculi subaequaliter affixi, connectivo lato; capsulae clavatae, pubescentes, 4-spermae; semina papillosa.

Slender shrubs, up to 1 meter high; stems densely yellowish-pilose, the hairs up to 2 mm. long; leaf blades oblong-ovate, up to 10 cm. long and 4 cm. wide, acute, short-acuminate, or occasionally obtuse at the apex, rounded or subcordate at the base, firm, both surfaces densely yellowish-pilose, the costa and veins prominent beneath, the cystoliths conspicuous; petioles about 2 mm. long, densely yellowish-pilose; spikes terminal and axillary, up to 12 cm. long, forming a large, terminal panicle; flowers borne in fascicles of 3–8 (or the uppermost solitary), sessile in the axils of the bracts, the internodes about 5 mm. long, the rachises and peduncles (up to 3 cm.

long) densely yellowish-pubescent, the hairs about 0.25 mm. long, some of them glandular; bracts narrowly oblong, 6 mm. long and 2 mm. wide, blunt at the apex, narrowed at the base, sparingly hirsute beneath with yellowish hairs 0.5 mm. long, glabrous above, the costa and veins prominent; bractlets linear, about 3 mm. long, 0.5 mm. wide, sparingly hirsutulous; anterior calyx segment setulose, about 2.5 mm. long, the other 4 narrowly lanceolate, 4.5 mm. long, 0.75 mm. wide at the base, minutely pubescent; corollas 8 mm. long, white and purple, finely and rather sparingly pubescent, the tube 1.5 mm. in diameter at the base, 2.5 mm. at the mouth, the lips 4 mm. long, the upper one narrowly ovate, acute, 2 mm. wide near the base, the lower 4 mm. wide, its lobes rounded, barely 0.5 mm. long, 1.2–2 mm. wide; anther lobes subequally attached, the connective broad; capsules 8 mm. long, clavate, finely pubescent, 4-seeded, the seeds papillose.—On rocks beside a forest stream, vicinity of El General, Prov. San José, 915 meters, December, 1936, *Skutch 3012* (type in U. S. Nat. Herb., No. 1,643,087). Possibly related to *J. Tonduzii*, but readily distinguishable by its larger size, dense and yellowish pubescence, larger and more densely flowered spikes, and thicker leaf blades.

Justicia Tonduzii Lindau in Pittier, Prim. 2: 313. 1900. Type from the forests of Río Naranjo, *Tonduz 7976*. Found also in the forests of Victoria Farm, Plains of Zent, *Pittier 16073*, and at La Colombiana, Prov. Limón, *Standley 36928*. Endemic. An erect herb, up to 30 cm. high; stems terete, the pubescence a mixture of small, curved hairs, arranged in 2 lines, and long, spreading ones (up to 3 mm. long) evenly distributed; leaf blades ovate, up to 9 cm. long and 4 cm. wide, short-acuminate (the tip blunt), narrowed or obtuse at the base, both surfaces pilose, the hairs up to 3 mm. long, or subglabrous at maturity; petioles about 5 mm. long, the pubescence a mixture of long, spreading hairs and short, curved ones; spikes terminal or axillary, slender, up to 7 cm. long, the flowers borne in fascicles of 3 or 4 in the axils of the bracts, the internodes up to 6 mm. long, the rachis and peduncle (up to 3 cm. long) pubescent with a mixture of short, curved and long, spreading hairs, some of them glandular; bracts ovate, stipitate, up to 5 mm. long and 2 mm. wide, the margins and costa with long, spreading hairs; bractlets narrowly oblong, up to 2 mm. long and 0.5 mm. wide, pilose; calyx 2.5 mm. long, the segments 5, subulate, pubescent, some hairs glandular; corolla 7–8 mm. long, purplish, sparingly and finely pubescent, the lips about 4 mm. long, the upper one minutely 2-lobed at the tip, the lobes of the lower lip rounded; anther lobes subequally attached, the lower smaller than the upper; capsules clavate, about 5 mm. long, pubescent.

Justicia trichotoma (Kuntze) Leonard, comb. nov. *Ecbolium trichotomum* Kuntze, Rev. Gen. 2: 488. 1891. *J. asymetrica* Lindau in Pittier, Prim. 2: 310. 1900 (Chilamate, bank of Río Sarapiquí, *Biolley 7383*). Limón, *Kuntze.* At low altitudes in wet forests and thickets. Honduras and Panama. Herbs or small shrubs, up to 1 meter high; branches subquadrangular, pubescent, the hairs small, curved, the lower portions of the stems becoming subterete and glabrous; leaf blades ovate to ovate-lanceolate, one blade of each pair conspicuously smaller than the other, the larger blades up to 10 cm. long and 4 cm. wide, the smaller up to 5 cm. long and 2 cm. wide, all long-acuminate (the tip itself blunt), narrowed at the base, the costa and veins pubescent, the hairs minute, curved, the intercostal spaces glabrous or sparingly pilose; petioles up to 2 cm. long, slender, puberulent; flowers borne in small, few-flowered, axillary cymes, the peduncles up to 4 cm. long, puberulent, the flowers sessile on the branches; bracts small, linear; calyx segments 7–8 mm. long, less than 1 mm. wide; corollas pale purple, pubescent, the tube subcylindric, 10 mm. long and about 1.5 mm. in diameter, the upper lip 5 mm. long and 4 mm. wide, minutely bifid at the apex, the lower lip 6 mm. long, its 3 lobes 5 mm. long, the middle one 2.5 mm. wide, the lateral ones 1.5 mm. wide, all obtuse; capsules 14 mm. long, about 2.5 mm. wide, puberulent, 4-seeded, stipitate; seeds 1.5 mm. in diameter, verruculose.

Justicia Valerii Leonard, sp. nov.—Herbae decumbentes, caulibus gracilibus, subteretibus, tenuiter retrorse pubescentibus; lamina foliorum ovata ad oblonga, acuta vel acuminata, basi angustata, supra glabra, subtus minute puberulenta vel subglabra, perspicue cystolithigera; petioli appresso-pubescentes; spicae terminales, solitariae vel geminae, pedunculis et rhachibus pubescentibus, pilis parvis, recurvatis, albidis, bracteis inferioribus lanceolatis, acutis vel acutiusculis, ceteris ellipticis, obtusis, vel rotundatis et obtuse apiculatis, basi abrupte angustatis, pallide viridibus, viridi-reticulatis, imbricatis, subglabris, ciliatis; bracteolae oblanceolatae, acutae, ciliatae; calycis segmenta tenuiter pubescentia, posticum minutum, setaceum, cetera lineari-subulata; corolla tenuiter pubescens, alba vel purpurascens, intus purpureo-maculata, labio superiore angusto, erecto, apice minute bidentato, inferiore patente, trilobo, lobis rotundatis; antherae loculi subaequaliter affixi, connectivo lato; capsulae clavatae, puberulentae.

Decumbent herbs, up to 30 cm. high; stems slender, subterete, puberulent or finely retrorse-pubescent; leaf blades ovate to oblong, up to 7 cm. long and 3 cm. wide, but usually smaller, acute to acuminate (the tip blunt), narrowed at the base, glabrous and dark gray-green, or with a blue-green, metallic tint above, paler and minutely pubescent or subglabrous beneath, the cystoliths conspicuous; petioles up to 1 cm. long, minutely appressed-pubescent; flowers borne in terminal, solitary or paired, bracted spikes up to 5 cm. long and 1 cm. in diameter; peduncles (up to 3.5 cm. long) and rachises finely pubescent, the hairs white and recurved, the lower pair of bracts lanceolate, up to 1 cm. long and 3 mm. wide, acute or obtusish, the others elliptic, 6–7 mm. long and about 4 mm. wide, obtuse or rounded at the apex, bluntly apiculate, rather abruptly narrowed at the base, all pale green with dark green, coarse reticulation, imbricate, subglabrous, ciliate; bractlets oblanceolate, 6 mm. long, 1.5 mm. wide, acute, ciliate; calyx sparingly and finely pubescent, the posterior segment setaceous, 3 mm. long, the other 4 linear-subulate, 5 mm. long and 0.5 mm. wide; corollas finely pubescent, white or purplish white with purple dots within, 9 mm. long, 2 mm. in diameter at the base, somewhat constricted above the ovary, 2.5 mm. wide at the mouth, the lips about 4 mm. long, the upper one narrow, erect, minutely bidentate at the apex, the lower one spreading, 4.6 mm. wide across the 3 rounded lobes; anther lobes subequally attached, the connective broad; capsules clavate, 7 mm. long, 2 mm. broad, puberulent.—Moist forest of Quebrada Serena, southeast of Tilarán, Guanacaste, 700 meters, January 27, 1926, *Standley & Valerio 46147* (type in U. S. Nat. Herb., No. 1,254,478), *46154, 46178, 46212.* Wooded stream bank at Dulce Nombre, Prov. Cartago, 1,400 meters, *Standley 35945.* Wet forests of El Muñeco, south of Navarro, Prov. Cartago, 1,400 meters, *Standley 33454.* Moist forests of El Silencio, Guanacaste, near Tilarán, 750 meters, *Standley & Valerio 44731.* El Silencio de San Ramón, *Brenes 17100.* El Rosario de Orosi, 1,120 meters, *Pittier 16614.* Wet forest in the vicinity of Fraijanes, 1,500–1,700 meters, *Standley & Torres 47522.* La Palma de San Ramón, *Brenes 15061.* La Piña de Zarcero, *A. Smith H305.* Wet forest of Los Ayotes, near Tilarán, Guanacaste, 600–700 meters, *Standley & Valerio 45543.* Moist forest of Naranjos Agrios, Guanacaste, 600–700 meters, *Standley & Valerio 46456.* Piedades Norte de San Ramón, *Brenes 6717.* In a clearing at Vara Blanca de Sarapiquí, north slope of Central Cordillera, *Skutch 3448*. Zarcero, *A. Smith H52*. Without definite locality, *Brenes 3698*. Closely related to *J. candelariae* (Oerst.) Leonard, but easily separated from that by the pubescence of the stems. In *J. candelariae* the hairs are rather coarse and spreading, but in this new species they are fine and retrorsely curved.

LEPIDAGATHIS Willd.

Herbs or low shrubs; leaves entire; flowers borne in dense spikes; calyx unequally 5-parted; corolla tube slender, subcylindric, the limb 2-lipped, the upper lip 2-cleft or emarginate, the lower 3-lobed; stamens 4, didynamous, the filaments short, the anther cells blunt; style entire; capsules oblong, pointed, 4-seeded (sometimes fewer); seeds flat, nearly orbicular.—There are about 60 species, mostly of the Old World tropics.

Lepidagathis alopecuroidea (Vahl) Griseb. Wet, shaded banks in woods, thickets, and fields. Central America to northern South America and West Indies. An herb; stems up to 50 cm. long, usually branched, erect, decumbent, or ascending, sometimes rooting at the lower nodes, short-pilose; leaf blades thin, ovate to elliptic, 3–8 cm. long, 2–3 cm. wide, acute or obtuse, narrowed at the base, repand or entire; petioles up to 2 cm. long; spikes usually terminal, 3–8 cm. long, 1–1.5 cm. in diameter, many-flowered; bracts lanceolate to oblong, about 6 mm. long, venose, ciliate; calyx segments unequal, 4–6 mm. long, the anterior pair lanceolate, connate at the base, the lateral pair linear, the posterior segment obovate; corollas white or violet, about as long as the calyx; stamens free at the base; anther sacs parallel, slightly unequal; capsules sessile, glabrous, about 4 mm. long.

LOUTERIDIUM S. Wats.

Shrubs; leaves petiolate, crenate or entire; flowers borne in narrow, nearly naked, terminal panicles or racemes; bracts small; calyx segments 3; corolla large, red or yellowish, the tube abruptly expanded above the ovary, broad and hood-shaped above, the lobes 5, short, subequal; stamens 2 or 4, exserted, the anther cells parallel; capsules sessile, the locules 6–8-seeded.—Several species are found in Mexico and Central America.

Louteridium costaricense Radlk. & Donn. Smith, Bot. Gaz. 37: 422. 1904. Known only from the type, collected in the forests of Las Vueltas, Tucurrique, *Tonduz 8123*. Glabrous shrubs; leaf blades oblong-elliptic, 28–31 cm. long, abruptly acuminate, narrowed at the base and decurrent on the petiole, membranous, entire; petioles up to 6 cm. long; flowers borne in a narrow panicle, the peduncle about 15 cm. long; bracts and bractlets ovate-lanceolate, 6–9 mm. long; pedicels 2–3.5 cm. long; calyx segments oblong, 2–4 cm. long, acute, reticulate-veined; corolla yellow; stamens 2.

MENDONCIA Vell.

Twining, herbaceous or suffrutescent vines; leaf blades usually ovate, elliptic, or oblong, petioled; flowers pediceled, one to several in the axils of the leaves, each flower subtended by a pair of conspicuous bracts; corolla usually red or white, 5-lobed, the tube narrow; stamens 4, paired; anther lobes diverging, bearded; calyx usually reduced to a minute ring; fruit drupaceous, usually dry and compressed at the tip.—The genus was named for Cardinal Mendonça, Patriarch of Lisbon. Although numerous in tropical South America, only five species are known at present in Central America.

Corolla 1.5 cm. long.................................*M. Brenesii.*
Corolla 3 cm. long or more.
  Stems strigose or glabrous; bracts less than twice as long as wide.
    Stems narrowly winged; bracts oblong, retuse at the apex. *M. retusa.*
    Stems quadrangular but not winged; bracts obovate, rounded or obtuse at the apex.....................*M. costaricana.*
  Stems pilose; bracts more than twice as long as wide.
    Bracts oblong-lanceolate, acuminate at the apex...*M. Lindavii.*
    Bracts oblong-elliptic, rounded at the apex.......*M. Tonduzii.*

Mendoncia Brenesii Standl. & Leonard, sp. nov.—Frutex volubilis, caulibus teretibus, glabris vel sparse et minute strigosis; lamina foliorum ovata, abrupte acuminata, mucronata, basi rotundata vel angustata, chartacea, glabra vel novella minute et sparse strigosa; petioli glabri; flores fasciculati; bracteae ovatae, obtusae, sparse et minute strigosae; corolla alba, parva, glabra, lobis obcordatis; stamina inclusa.

Scandent, the stems subterete, grooved, glabrous or sparingly and minutely strigose; leaf blades ovate, up to 11 cm. long and 6 cm. wide, abruptly acuminate and tipped by a mucro about 2 mm. long, rounded or narrowed at the base, firm, glabrous or the uppermost minutely and sparingly strigose; petioles up to 3 cm. long, glabrous; flowers several, radiating from short, flattened, rounded, axillary spurs; pedicels about 1 cm. long, sparingly and minutely strigose; bracts ovate, 10–14 mm. long, 6–7 mm. wide, obtuse, sparingly and minutely strigose; corollas 1.5 cm. long, white, glabrous, the tube about 8 mm. long and 3 mm. in diameter, slightly expanded at the base, the lobes obcordate, about 7 mm. in diameter; stamens included, the filaments 1.5 mm. long; fruit not seen.—La Palma de San Ramón, August 26, 1928, *Brenes 6269* (type in Herb. Field Mus., No. 855,431), *4406, 5631*. This is quite unlike any other *Mendoncia* found in Central America. It has axillary umbels of small, white flowers.

Mendoncia costaricana Oerst. Vid. Medd. Kjoebenhavn 1854: 113. 1855. Cerro de Aguacate, *Oersted;* collected by Oersted also at Quebrada Honda, 540 meters, and south of Cartago. Found occasionally in wet forests. Also seen in Panama. Large, herbaceous vines; stems obscurely quadrangular, slightly grooved, strigose; leaf blades ovate-elliptic 5–10 cm. long, 1.5–5 cm. wide, acuminate and sometimes falcate at the apex, tipped by a mucro 1–2 mm. long, rounded or narrowed at the base and slightly decurrent on the petiole, thin, hirtellous and barely scabrous above (the hairs arising from star-shaped bases), softly pubescent beneath; petioles 15–19 mm. long, strigose; flowers 1 or 2 in the axils of the upper leaves; peduncles 1–1.5 cm. long, strigose; bracts obovate, 12–15 mm. long, 10–11 mm. wide, obtuse or rounded and apiculate at the apex, subcordate at the base, strigose; corollas white, the throat with dark purple spots, glabrous, 3 cm. long, the tube 8 mm. broad at the throat, the lobes orbicular, 4–5 mm. wide, emarginate; ovary glabrous.

Mendoncia Lindavii Rusby. Occasional in wet forests of the lower mountain slopes (up to 900 meters). Its range extends from British Honduras and Guatemala as far south as Bolivia. A large, densely ferruginous-pilose vine; leaf blades ovate to broadly oval, 5–10 cm. long, 2–5.5 cm. wide, acuminate and sometimes mucronate at the apex, narrowed or rounded at the base; petioles up to 1.5 cm. long; flowers single or in pairs; pedicels 2–3 cm. long; bracts oblong-lanceolate, subfalcate, 3–4 cm. long, 1 cm. wide, acuminate and usually mucronate at the apex, partly connate; corollas red, pink, or white, 4–5 cm. long, tubular, glabrous, the lobes rounded, 4–5 mm. long, entire; fruit ovoid, compressed, keeled, about 2 cm. long and 1 cm. wide, brown-puberulent.

Mendoncia retusa Turrill. Common in moist forests. Also in other parts of Central America. Stem conspicuously quadrangular, narrowly winged, glabrous or sparingly pilose toward the tip; leaf blades elliptic, 5–12 cm. long, 3–7 cm. wide, abruptly acuminate and mucronulate at the apex, rounded or narrowed at the base, entire, glabrous, or the costa and lateral veins sparingly pilose; flowers solitary, the pedicels 2–3 cm. long; bracts oblong, 1–2.5 cm. long, 1.5 cm. wide, rounded at both ends, retuse and apiculate at the apex, glabrous; corolla white with a purple throat, glabrous, 4–5 cm. long, the lobes broadly obovate, spreading, 5–10 mm. long; fruit black, minutely puberulent or glabrescent, ovoid, about 1.5 cm. long.

Mendoncia Tonduzii Turrill, Kew Bull. 413. 1919. Tucurrique, *Tonduz 12946*. Rarely found except at the type locality. Endemic. A suffrutescent vine; stems quadrangular, hirsute; leaf blades elliptic, up to 13 cm. long and 8 cm. wide, acuminate, narrowed at the base, pilose and subscabrous above (the hairs arising from star-shaped bases), rather densely and softly pilose with yellowish, curved hairs below; petioles 2–3 cm. long, hirsute; flowers solitary or in pairs in the axils of the upper leaves; pedicels 2–3 cm. long, densely yellowish-hirsute; bracts oblong-elliptic, up to 3.5 cm. long and 1.5 cm. wide, rounded at both ends, apiculate at the apex, the costa prominent, densely and softly yellowish-hirsute without, glabrous within; corolla about 5 cm. long, white, glabrous, about 8 mm. broad at the oblique throat, the lobes ovate, spreading, about 8 mm. long and 5–6 mm. wide; fruit oblong, slightly compressed, 2 cm. long, 12–14 mm. wide, doubly keeled when dry, puberulent.

NELSONIA R. Br.

A monotypic genus, ranging from Mexico to northern South America and the West Indies; also in the Old World tropics.

Nelsonia brunelloides (Lam.) Kuntze. Common in dry thickets or forests. A diffuse, softly villous herb; leaves entire; flowers borne in terminal and axillary, bracted spikes; calyx 4-lobed, the posterior segment 2-toothed or 2-cleft; corolla blue or purple, the tube slender, the limb 2-lipped, the upper lip 2-cleft, the lower 3-lobed; stamens 2, the filaments short, the anther sacs mucronulate at the base; ovules several in each cavity; stigma 2-lobed; capsules oblong, beaked; seeds pubescent with peculiar, anchor-shaped hairs.

ODONTONEMA Nees

Herbs or shrubs; leaves usually large, entire; flowers borne in narrow, terminal panicles; calyx 5-parted, the segments small and narrow; corollas white, red, or yellow, the tube slender, the throat only slightly enlarged, the limb 2-lipped, nearly regular; stamens 2, the anther sacs blunt at the base; staminodes 2; capsules oblong, stipitate; seeds 4 or fewer.—A genus of 30 or more species, confined chiefly to tropical America.

Rachis tomentose or subtomentose...............*O. callistachyum.*
Rachis glabrous or sparingly puberulent.
  Inflorescence gradually diminished to a flagellate, flowerless tip. *O. flagellum.*
  Inflorescence flowering to the tip..................*O. strictum.*

Odontonema callistachyum (Schlecht. & Cham.) Kuntze. Thickets, southern Mexico and Central America. Suffrutescent, 2–4.5 meters high; leaves lance-oblong to elliptic-ovate, 10–30 cm. long, acuminate, the uppermost sessile, the lower petiolate; inflorescence an interrupted, racemiform or paniculate thyrse, the flowers borne in fascicles, these subtended by triangular, cuspidate bracts about 4 mm. long, the rachis and pedicels tomentose or subtomentose; calyx segments subulate, about 2 mm. long, ciliolate; corolla pink or red, glabrous, 2–3 cm. long, 5 mm. broad at the throat, the lips 4–5 mm. long, the upper 2-lobed (the lobes about 3 mm. long), the lower 3-lobed nearly to the base, all the lobes rounded and ciliolate near the tip; staminodes 0.5–1 mm. long; capsules 2 cm. long, narrow and solid from middle to base, glabrous.

Odontonema flagellum (Oerst.) Kuntze, Rev. Gen. 2: 494. 1891. *Thyrsacanthus flagellum* Oerst. Vid. Medd. Kjoebenhavn 1854: 146. 1855. Turrialba, *Oersted.* Forests. Endemic. Suffrutescent, up to 2 meters high; stems glabrous; leaf blades oblong-elliptic to lanceolate, up to 30 cm. long and 11 cm. wide, acuminate, ending in a blunt and sometimes curved tip, narrowed at the base to a short, winged petiole, glabrous or minutely and inconspicuously puberulent beneath; inflorescence a slender raceme, simple, or branched at the base, and ending in a slender, flagellate, sterile tip; flowers 6 or more (sometimes fewer toward the tip), crowded in opposite clusters usually about 1 cm. distant on the rachis and subtended by triangular bracts 3.5 mm. long and 1.5 mm. wide at the base; bractlets similar but smaller; pedicels red, slender, up to 7 mm. long, these and the rachis and bracts minutely and sparingly hirsutulous; calyx 3–4.5 mm. long, red, essentially glabrous, minutely ciliolate, the segments narrowly triangular, 2–3 mm. long, 0.5–0.75 mm. wide at the base; corolla 2–2.5 cm. long, bright red, glabrous, the lower portion of the tube slender, about 1.5 mm. in diameter, to about 5 mm. above the base, thence rather abruptly enlarged to 4–5 mm., the lobes rounded or obtuse, minutely ciliolate; staminodes truncate, about 0.75 mm. long; capsules 2 cm. long, glabrous, long-stipitate.

Odontonema strictum (Nees) Kuntze. Forests of Central America. Suffrutescent, 1–2 meters high, glabrous; leaves up to 35 cm. long and 12 cm. wide, acuminate, narrowed at the base to a short petiole; inflorescence a simple or branched raceme up to 30 cm. long or more, the rachis minutely puberulent; flowers borne in pseudo-whorls, the pedicels short, subtended by a keeled, acuminate outer bract (1 mm. wide at the base) and several minute, subulate inner bracts; calyx 3 mm. long, the segments subulate, purplish red; corolla rich scarlet, tubular, or slightly funnelform, the lips about 6 mm. long, the upper one 2-lobed at the tip, the lower 3-lobed nearly to the base, the lobes ovate, obtuse, minutely ciliolate; fertile stamens reaching the notch in the upper lip; staminodes about 0.5 mm. long, subulate; style shorter than the corolla tube.

POIKILACANTHUS Lindau

Herbs or shrubs; flowers borne in small, terminal or axillary, bracted spikes or heads; calyx 5-parted; corolla slender, 2-lipped; stamens 2, the anthers unequally attached, the lobes rounded or ending in a short spur; staminodes none; pollen elliptic, marked with hexagonal plates ("facettierter Pollen").—Several species are found in South America.

Poikilacanthus macranthus Lindau. Wet forests of Costa Rica, Guatemala, and Nicaragua. Shrubs up to 2 meters high; stems terete, glabrate or the tips yellowish-subtomentose; leaf blades oblong-ovate, 2.5–9 cm. long, 1.5–4.5 cm. wide, acuminate, the tip blunt, narrowed at the base, subglabrous above, the nerves and margins of the lower surface pilosulous, the hairs curved, appressed or ascending; petioles 7–15 mm. long, subtomentose; flowers borne in short, terminal, sessile heads, each head with 5–6 flowers; bracts oblong, up to 9 mm. long and 2 mm. wide, hirsutulous; bractlets similar but smaller; calyx segments lanceolate, about 5 mm. long and 1.5–2 mm. wide, ciliate; corolla light pink or lavender, sparingly pubescent (the hairs about 0.5 mm. long, some of them gland-tipped), the tube 3.5 cm. long, 3 mm. in diameter at the base, gradually enlarged to 6 mm. at the mouth, the upper lip 3 cm. long, 10 mm. wide at the base, bilobed at the tip, the lobes 1 mm. long, the lower lip 24 mm. long, 5 mm. wide at the base, 11 mm. at the middle, the middle lobe 1.5–2 mm. long, obtusish, the lateral lobes 1.5 mm. long, 3 mm. wide, acutish; stamens reaching to the tips of the lips; anther lobes obtuse, unequally attached; style about 7 cm. long; capsules about 1.5 cm. long, pilosulous, the basal half about 4 mm. broad, solid, the upper half ovate, 4-seeded; seeds flat, black to light brown, minutely roughened. Distinct from *Beloperonides macrantha* Oerst., erroneously treated as a synonym by Lindau in Pittier, Prim. 2: 307. 1900.

PSEUDERANTHEMUM Radlk.

Herbs or small shrubs; leaves usually ovate; flowers borne in terminal or axillary, bracteate spikes, the bracts and bractlets small; calyx segments 4 or 5, subulate; corolla white, blue, or pink, the tube slender, the limb spreading, the 5 lobes subequal; stamens 2, included; staminodes 2, minute; anther cells 2, muticous or acute at the base; capsules long-stipitate; seeds 2 or 4.—A genus frequently found in tropical regions throughout the world. Several species other than those here described have been found in Central America.

Calyx puberulent, some of the hairs gland-tipped.
  Flowers crowded in opposite fascicles or in whorls, and borne in a narrow, terminal raceme; leaf blades, or some of them, more than 9.5 cm. long .... *P. Pittieri.*
  Flowers mostly alternate and solitary, borne in a much branched panicle of slender, lax spikes; leaf blades 9.5 cm. long or less. *P. Standleyi.*
Calyx essentially glabrous, eglandular.
  Leaf blades thin, green, the petioles long and conspicuously winged; flowers sessile or subsessile; native species..... *P. cuspidatum.*
  Leaf blades firm, often purple, the petioles short and not conspicuously winged; pedicels up to 6 mm. long; cultivated species. *P. atropurpureum.*

Pseuderanthemum atropurpureum (Bull) Bailey. *Eranthemum atropurpureum* Bull. Widely planted in tropical regions of America. A shrub, up to 2 meters high; stem glabrous; leaf blades ovate, up to 12 cm. long and 5 cm. wide, or occasionally larger, short-acuminate or obtuse and apiculate at the apex, narrowed at the base, purple, entire, glabrous, both surfaces bearing numerous minute, subpunctiform cystoliths; petioles short; flowers numerous, crowded in subsessile fascicles forming narrow, terminal, simple or sparingly branched racemes, the rachis and pedicels (up to 6 mm. long) usually glabrous; bracts oblong, about 5 mm. long, ciliolate; calyx segments narrowly triangular, ciliolate; corollas 15–20 mm. long, glabrous, purple, or white with purple throat, the limb 15–20 mm. broad, the segments ovate, rounded.

Pseuderanthemum cuspidatum (Nees) Radlk. *Eranthemum cuspidatum* Nees. River banks and borders of woods. Southern Mexico, Central America, and northern South America. Herbs, 30–50 cm. high or more; stems glabrous or sparingly hirtellous, the hairs scattered or confined to 2 lines; leaf blades ovate to elliptic, variable in size, up to 17 cm. long and 9 cm. wide, acuminate (the tip blunt), rounded or narrowed at the base and decurrent on the petiole, thin, green, sparingly hirtellous; petioles up to 13 cm. long, winged, about 1 cm. broad at the base of the blade; flowers sessile or subsessile, solitary or several in a cluster, borne in lax, terminal spikes, these sometimes forming a sparingly branched panicle, the rachis sparingly and minutely hirtellous, the lowermost pair of bracts or those subtending the branches of a paniculate inflorescence suborbicular, up to 3 cm. long and 2.5 cm. wide, mucronate at the apex, the bracts subtending the flowers narrowly triangular, glabrous, or ciliate toward the base; bractlets about 1 mm. long; calyx 4–5 mm. long, glabrous, ciliolate, the segments 5, subulate; corolla about 3 cm. long, violet or purple, glabrous, the tube very slender, scarcely enlarged to the throat, the limb about 1 cm. broad, the segments ovate or elliptic, 8 mm. long; capsules 12–14 mm. long, clavate, glabrous, 4-seeded, pointed at the apex, the lower half slender and solid; seeds flat, roughened.

Pseuderanthemum Pittieri Leonard, sp. nov.—Herba vel suffrutex, caulibus glabris vel apice minute pubescentibus; lamina foliorum elliptica, breviter acuminata, basi angustata, glabra vel subtus in costa et venis lateralibus sparse puberulenta; petioli puberulenti; racemi laxi, angusti, pedunculo longo, pilosulo, floribus solitariis vel laxe fasciculatis, pedicellis et rhachibus glanduloso-puberulentis; bracteae subulatae, minute pubescentes; calycis segmenta subulata, plus minusve glanduloso-pubescentia; corolla minute et sparse pubescens, tubo gracili, lobis ovatis.

Herbaceous or suffrutescent; stems glabrous or minutely pubescent toward the tip, with minute, subpunctiform cystoliths; leaf blades elliptic, up to 14 cm. long and 8 cm. wide, short-acuminate, narrowed at the base, glabrous, or the costa and lateral veins beneath sparingly puberulent, with slender, inconspicuous cystoliths above;

petioles up to 2 cm. long, puberulent; flowers opposite, usually several in a fascicle, borne in loose, narrow, terminal racemes, the peduncles up to 12 cm. long, with several pairs of small, sterile bracts, pilosulous, the pedicels up to 1.5 mm. long, these and the rachises glandular-puberulent; flower bracts up to 3 mm. long, subulate, minutely pubescent; bractlets similar but shorter; calyx segments subulate, 2–3.5 mm. long, minutely puberulent with glandular and eglandular hairs; corollas 2 cm. long, minutely and sparingly pubescent, the tube of fully expanded flowers about 12 mm. long, 1 mm. in diameter at the base, 3 mm. at the mouth, the limb about 2 cm. broad, the lobes ovate; capsules not seen.—Along Río Hondo, 50 meters, February 15, 1903, *Pittier 16641* (type in U. S. Nat. Herb., No. 1,080,220). Related to *P. adenocalyx* Lindau, of Guatemala, but readily separated from that species by the shape and size of its leaf blades and its much larger flowers. In *P. adenocalyx* the leaf blades are oblong-lanceolate and are not more than 7 cm. long and 2 cm. wide, and the corolla tube is very slender (0.5 mm. wide at the base and 1 mm. at the mouth). The lobes are likewise much smaller in that. From the herbarium material it is impossible to determine the height of the present plant or the color of the flowers.

Pseuderanthemum Standleyi Leonard, sp. nov.—Herbae, caulibus bifariam pilosulis; folia petiolata; lamina ovata ad lanceolata, acuta vel acuminata, basi angustata vel rotundata, in petiolum decurrens, membranacea, supra sparse hispidula, subtus in costa et venis hirtella; racemi spiciformes laxi, graciles, in paniculam terminalem aggregati, floribus solitariis, saepe alternis, rhachibus sparse glanduloso-puberulentis; bracteae et bracteolae subulatae, carinatae, glabrae vel ciliatae, interdum pilos paucos glanduliferos gerentes; pedicelli glanduloso-puberulenti; calycis segmenta subulata, plus minusve glanduloso-puberulenta; corolla roseo-purpurea, tenuiter et sparse pubescens, tubo gracillimo, lobis ellipticis; capsulae clavatae, glabrae; semina plana, pallide brunnea, rugulosa.

Herbs, up to 1 meter high; stems pilosulous in 2 lines; leaf blades ovate to lanceolate, up to 9.5 cm. long and 5 cm. wide, acute to acuminate (blunt at the tip), narrowed or rounded at the base and decurrent on the petiole, thin, sparingly hispidulous above, the costa and veins hirtellous beneath; petioles up to 3 cm. long; flowers solitary, mostly alternate, borne in a panicle of slender, lax, spike-like racemes, the rachises rather sparingly glandular-puberulent; bracts and bractlets subulate, about 2 mm. long, carinate, glabrous or ciliolate (sometimes with a few minute, glandular hairs); pedicels up to 3 mm. long, glandular-puberulent; calyx 5–6 mm. long, puberulent, some of the hairs gland-tipped, the segments linear-subulate; corollas bright rose-purple, 1.5 cm. long, sparingly and minutely pubescent, the tube very slender, 0.5–1 mm. in diameter, the upper part oblique, enlarged to 1 mm. in diameter, the limb about 1 cm. broad, the lobes elliptic, about 3 mm. wide; staminodes slightly longer than the filaments of the fertile stamens; capsules 10–15 mm. long, clavate, glabrous, 4-seeded; seeds flat, light brown, oblique, 4 mm. long and 3 mm. wide, roughened.—Moist thickets along Río Reventado, north of Cartago, 1,460–1,650 meters, February 26, 1926, *Standley & Valerio 49481* (type in U. S. Nat. Herb., No. 1,306,060). Vicinity of Santa María de Dota, Prov. San José, 1,500–1,800 meters, *Standley 41714, 41725, 42538.* Oak forest near Quebradillas, 7 km. north of Santa María de Dota, Prov. San José, 1,800 meters, *Standley 42912.* Unlike any other Central American species because of its relatively small, thin leaves, usually much branched panicles, peduncled, alternate, solitary flowers, and slender, linear, finely puberulent calyx segments.

RAZISEA Oerst.

Shrubs with large, ovate or oblong-elliptic, petioled leaves bearing minute cystoliths; flowers borne in a peduncled, terminal thyrse; bracts small; calyx segments 5, subequal, narrow; corollas red, the tube narrowly infundibuliform, subcurved, gradually enlarged from base to throat, the upper lip narrow, acute, minutely bidentate, the lower lip broad, blunt, with 3 small, suborbicular lobes at the tip; stamens 2, long-exserted; anthers oblong, 1-celled; capsules slender, stipitate, 4-seeded, the seeds roughened.—A single species, apparently limited to Costa Rica and Panama.

Razisea spicata Oerst. Vid. Medd. Kjoebenhavn 1854: 142. 1855. *Coral. Kolobochilus leiorhachis* Lindau in Pittier, Prim. 2: 308. 1900 ("Costa Rica et Veragua," *Warscewicz*). Cerro de Aguacate, 450 meters, *Oersted.* Wet mountain forests of Costa Rica and Panama. A shrub, up to 3 meters high; stems quadrangular, pilose or subtomentose, becoming glabrous; leaf blades ovate to oblong-ovate or elliptic, up to 35 cm. long and 20 cm. wide, acuminate, often caudate, narrowed at the base, glabrous, or the veins minutely pubescent beneath; petioles up to 3 cm. long, glabrous; inflorescence a spiciform, pedunculate, terminal thyrse up to 30 cm. long, the rachis minutely pubescent, becoming glabrous, the flowers borne in opposite fascicles, these usually from 3–20 mm. distant; pedicels slender, up to 10 mm. long, glabrous; bracts triangular, about 5 mm. long and 2 mm. wide at the base, glabrous; bractlets similar but smaller; calyx glabrous, the segments linear, 7–8 mm. long, 1 mm. wide at the base; corolla about 4 cm. long, bright red, glabrous, the tube subcylindric, gradually enlarged from 2 mm. at the base to 5–7 mm. at the mouth, the upper lip lance-ovate, 8 mm. long, 3–4 mm. wide toward the base, ending at the apex in a slender, minutely bidentate tip, the lower lip short, subtruncate, 9–12 mm. broad, divided at the tip into 3 rounded lobes about 1 mm. in diameter; filaments about 4 cm. long, the anthers 5 mm. long; ovary glabrous; capsules about 17 mm. long, glabrous; seeds roughened.

RUELLIA L.

Perennial herbs or shrubs; leaves petioled, entire or rarely dentate; flowers usually large and showy, solitary or clustered in the axils, or borne in terminal, cymose panicles; calyx usually 5-parted, the segments often narrow; corollas red, yellow, white, or purple (usually mauve), funnelform or salverform, sometimes saccate, the lower portion of the tube usually narrow, the limb with 5 obtuse, spreading lobes; stamens 4, didynamous, the anther sacs blunt at the base; stigma lobes unequal; capsules oblong, cylindric, or clavate; seeds flat, usually pubescent, mucilaginous when moistened.—A large, cosmopolitan genus, found in both tropical and temperate regions.

Flowers sessile (or some of them short-peduncled), borne in the axils of the leaves or in a terminal head.
  Corolla white or yellow; flowers borne on a terminal, conical rachis. *R. tetrastichantha.*
  Corolla mauve or purplish; flowers axillary.
    Leaf blades large, at least some of them 10 cm. long or more, acuminate.
      Corolla 4–5 cm. long, the limb 3 cm. broad; leaves dull. *R. achimeniflora.*
      Corolla 3 cm. long or less, the limb 1–2 cm. broad; leaves lustrous.
        Capsules puberulent; corolla 2.5 cm. long..... *R. metallica.*
        Capsules glabrous; corolla 3 cm. long........ *R. barbillana.*
    Leaf blades small, 5 cm. long or less, obtuse or acutish. *R. geminiflora.*

Flowers or flower clusters peduncled.
  Ovary and capsule glabrous (the calluses at the tip sometimes more or less pubescent).
    Calyx with glandular hairs.
      Corollas large, 5–6 cm. long .... *R. malacosperma.*
      Corollas small, 3 cm. long or less.
        Capsules cylindric .... *R. paniculata.*
        Capsules clavate, flattened .... *R. inundata.*
    Calyx with eglandular hairs, or subglabrous.
      Flowers secund at the ends of long, horizontal or slightly ascending peduncles; corollas 3–4 cm. long. *R. stemonacanthoides.*
      Flowers not secund; corollas 2.5 cm. long or less.
        Peduncles 10–22 cm. long; leaf blades up to 21 cm. long. *R. Pittieri.*
        Peduncles up to 9 cm. long; leaf blades up to 10 cm. long. *R. Tonduzii.*
  Ovary and capsule puberulent.
    Flowers fascicled at the ends of the long, sharply angled peduncles; corollas 2 cm. long .... *R. Biolleyi.*
    Flowers solitary at the end of the peduncle or borne in dichotomously branched cymes; corollas 3 cm. long or more.
      Leaf blades obtuse or rounded at the apex, grayish-puberulent. *R. nudiflora* var. *puberula.*
      Leaf blades acuminate, not gray-puberulent.
        Corollas usually lavender, 4 cm. long or more. *R. jussieuoides.*
        Corollas white, 2.5 cm. long or less .... *R. Cooperi.*

Ruellia achimeniflora (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 503. 1882. *Arrhostoxylum achimeniflorum* Oerst. Vid. Medd. Kjoebenhavn 1854: 131. 1855. Cerro de Aguacate, *Oersted.* Wet thickets, chiefly in the vicinity of Cartago and San José. Endemic. Herbs, up to 60 cm. high; stems simple or sparingly branched, quadrangular, sharply angled or narrowly winged, minutely pilosulous, the hairs confined chiefly to the angles and nodes; leaf blades oblong-ovate, 4–14 cm. long, 1–7 cm. wide, acuminate (the tip blunt), acute or obtuse at the base and decurrent on the petiole, pilosulous (often sparingly so), the hairs confined chiefly to the costa and lateral veins, these prominent, both surfaces with numerous delicate cystoliths; flowers solitary or in 3's, subsessile or borne on short, axillary peduncles crowded at the tips of the branches; bracts oblong-lanceolate, 2–3 cm. long, 3–5 mm. wide; bractlets linear-spatulate, 1 cm. long, 1–2 mm. wide; calyx 9 mm. long, the segments lanceolate, slightly unequal, 6–7 mm. long, 1 mm. wide at the base, ciliolate, the midrib prominent; corollas 4–5 cm. long, rose-purple, finely pubescent or subtomentose, the tube very slender, curved, 5 mm. broad at the mouth, the limb 3 cm. broad, the lobes obcordate; capsules 1.5–1.6 cm. long, 5 mm. broad, clavate, acutish at the tip, narrowed to a solid base 6 mm. long and 2.5 mm. broad, puberulent, 12-seeded; seeds brown, about 3 mm. in diameter, glabrous.

Ruellia barbillana Cufodontis, Archivio Bot. 10: 47. 1934. The type was collected near Finca Waldeck on the bank of Río Barbilla, *Cufodontis.* The following description is adapted from the original. Plants up to 40 cm. high; stem quadrangular, bearing numerous punctiform cystoliths, the angles retrorsely hirsute; leaf blades ovate-lanceolate, up to 10 cm. long and 2.5 cm. wide, long-attenuate at the base, abruptly acuminate at the apex, subrepand or undulate, glabrous or the costa and nerves appressed-hirsute below, both surfaces bearing cystoliths; petioles 1–1.5 cm. long; flowers sessile, borne in glomerulate cymes in the axils of the upper leaves; bracts and bractlets small; calyx 5 mm. long, the segments subulate, glabrous, with cystoliths; corollas lilac, glabrous, about 3 cm. long, 2 mm. in diameter at the base, 6 mm. at the mouth, the limb spreading, the lobes ovate, rounded, about 8 mm. long and 6 mm. wide; stamens included; capsules glabrous, 6-seeded.

Ruellia Biolleyi Lindau in Pittier, Prim. 2: 301. 1900. Junction of Río Puerto Viejo and Río Sarapiquí, *Biolley 7396.* Wet forests of Costa Rica and Panama. Stem usually erect, quadrangular (the angles sharp or narrowly winged), sparingly pilosulous; leaf blades oblong-ovate to oblong-elliptic, 10–17 cm. long, 4–6 cm. wide, narrowed at each end (the tip blunt), membranous, glabrous except the costa and veins below, these pubescent; petioles up to 3 cm. long; flowers borne in fascicles terminating sharp-angled, axillary peduncles up to 20 cm. long; bracts and bractlets small, lanceolate; calyx 4–6 mm. long, the segments linear-subulate, minutely but rather sparingly glandular-pilosulous (occasionally eglandular); corollas blue(?), about 2 cm. long, sparingly puberulent, the lower portion of the tube 1 mm. in diameter, the throat about 6 mm. broad, the lobes rounded, about 4 mm. wide; capsule 12 mm. long, 3 mm. broad, pointed at the tip, narrowed to a solid basal portion 6 mm. long and 1.5 mm. broad, glandular-puberulent, 4-seeded; seeds flat, ovate.

Ruellia campestris (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 504. 1882. *Gymnacanthus campestris* Oerst. Vid. Medd. Kjoebenhavn 1854: 126. 1855. Type collected at Hacienda Santa Rosa, Guanacaste, *Oersted.* Probably a small-leaved form of *R. geminiflora* HBK.

Ruellia Cooperi Leonard, sp. nov.—Herba vel suffrutex, caulibus quadrangularibus, glabris vel ad nodos parce puberulentis, angulis anguste alatis; lamina foliorum oblonga, breviter acuminata, basi angustata, supra glabra, subtus in costa et venis lateralibus pilis minutis brunnescentibus curvatis instructa; petioli pubescentes; paniculae laxae, axillares, dichotomo-ramosae, longe pedunculatae, pedunculis gracilibus, glabris, acute angulatis, floribus solitariis vel geminis, pedicellis glabris vel pilos paucos patentes glanduliferos gerentibus; calycis segmenta subulata, glabra vel sparse glanduloso-puberulenta; corolla infundibuliformis, minute et sparse pubescens, lobis rotundatis; stamina inclusa; capsulae clavatae, minute et parce retrorse pubescentes.

Herbaceous or suffrutescent; stems quadrangular (the angles winged), glabrous, or the tips and nodes sparingly pubescent, the cystoliths numerous, minute, subpunctiform; leaf blades oblong, up to 16 cm. long and 5 cm. wide, short-acuminate (the tip blunt), narrowed at the base, glabrous above, the costa and lateral nerves minutely brownish-pubescent beneath, the hairs incurved; petioles up to 3.5 cm. long, minutely pubescent; flowers borne in peduncled, dichotomously branched, axillary panicles, the peduncles up to 30 cm. long, slender, sharply angled, glabrous, the rachises (sometimes 2 pairs at each node) slender, sharply angled, glabrous, often horizontally spreading, some of the internodes curved; flowers solitary or in pairs, borne at the nodes of the inflorescence or terminating its branches; pedicels up to 4 mm. long, glabrous or with a few minute, spreading, glandular hairs; calyx 6–7 mm. long, the segments 4–5 mm. long, subulate, 0.75 mm. wide at the base, glabrous or with a few minute, glandular hairs; corollas 2.5 cm. long, white, minutely and sparingly pubescent, the tube slender below, 1.5 mm. in diameter for about 12 mm. of its length, thence obliquely expanded and obconic, 6–7 mm. broad at the mouth, the limb 8–12 mm. broad, subregular, the lobes rounded, about 5 mm. in diameter; stamens included; capsules about 15 mm. long, 4 mm. wide, clavate, the solid stipe about 1 cm. long, the entire capsule minutely and rather sparingly retrorse-pubescent.—Daytonia Farm, region of Almirante, Province of Bocas del Toro, Panama, January to March, 1928, *Cooper 185* (type in Herb. Field Mus., No. 579,478). Distinguishable from *R. Pittieri* by its pubescent capsules, more slender inflorescence, and nearly glabrous corollas. Although known only from Panama, its range probably extends into Costa Rica.

Ruellia geminiflora HBK. Fields and waste places. Central America, West Indies, and northern South America. An herb, up to 50 cm. high, the stems erect or ascending, pilosulous; leaf blades ovate, oblong, or lanceolate, short-petioled, 1.5–5 cm. long, 0.5–2 cm. wide, obtuse or acutish at the apex, narrowed at the base, entire, hirtellous; flowers axillary; calyx 10 mm. long or less, pilosulous, the segments linear-lanceolate; corollas mauve, pubescent, usually 2.5–3 cm. long, the lobes suborbicular, 5–10 mm. wide; capsules 8 mm. long, 4 mm. wide, puberulent, 4-seeded.

Ruellia inundata HBK. Dry forests and thickets. Mexico, Central America, and Colombia. Herbaceous or suffrutescent, up to 2 meters high; stems simple or branched, the tips glandular-pilose, the lower portions becoming whitish and glabrate; leaf blades lance-oblong to ovate, up to 15 cm. long and 7 cm. wide, acuminate, acute or rounded at the base, denticulate, repand-crenulate or subentire, hispidulous or occasionally grayish-pubescent beneath; petioles up to 9 cm. long, pilose; inflorescence axillary, the branches erect or ascending, dichotomous, glandular-pubescent, sometimes a dense, cylindric panicle; bractlets oblong, 3–8 mm. long, 1–3 mm. wide; calyx 8–15 mm. long, glandular-pilose, the segments linear; corollas purplish, pubescent, 2–2.5 cm. long, the lobes rounded, about 5 mm. wide; capsule 8–9 mm. long, 3 mm. wide, flattened, pointed at the apex, narrowed to a slender, solid base, glabrous, 2–4-seeded; seeds flat, 4 mm. long, 3 mm. wide.

Ruellia jussieuoides (Nees) Schlecht. Collected in a riverside thicket in the vicinity of El General and at Rodeo de Pacaca. Found also on the Río Xucpec, Guatemala. Herbs or slender shrubs; stems erect or ascending (sometimes supported by other plants), up to 2.5 meters high, quadrangular, with curved hairs; leaf blades narrowly lanceolate, 6–15 cm. long, 1–3 cm. wide, slenderly acuminate (the tip obtuse), gradually narrowed from about the middle to the base, entire or undulate, both surfaces pilosulous, the hairs thickest on the costa and nerves (these conspicuous), the cystoliths prominent; petioles 1–2 cm. long, pubescent; flowers 1–3, subsessile, borne on peduncles up to 7 cm. long, these solitary or in pairs, sparingly pubescent; bracts subtending the flowers narrowly lanceolate, usually about 2.5 cm. long and 3–5 mm. wide; calyx 6–14 mm. long, sparingly pilosulous, the segments narrowly linear, 1 mm. wide at the base, with conspicuous cystoliths; corollas lavender or occasionally white, 4–5 cm. long, minutely pubescent, the tube slender and usually curved, about 2 mm. in diameter at the base, 5 mm. at the mouth, the limb 2–5 cm. broad, the lobes elliptic, 1.5–2 cm. wide; capsules 13 mm. long, 3–5 mm. broad, pointed, abruptly narrowed to a slender, solid base 4.5 mm. long and 1.5–2 mm. broad, obscurely puberulent, 12-seeded; seeds flat, suborbicular, 1.5 mm. in diameter.

Ruellia malacosperma Greenm. Cultivated in the Meseta Central; also at La Hondura. Mexico to Nicaragua. Herbaceous; stem up to 60 cm. high, glabrous or sparingly pilose; leaf blades lanceolate to oblong-elliptic, up to 12 cm. long and 3.5 cm. wide, gradually narrowed from about the middle to an acute or obtuse tip, narrowed at the base, undulate, glabrous, or the costa and margins pilose; petioles 0.5–3 cm. long, glabrous or pilose; inflorescence axillary, once or twice dichotomous, the peduncles slender, 3–6 cm. long, glabrous; calyx 1.2–2 cm. long, more or less glandular-puberulent or sometimes glabrate, the segments linear-subulate; corollas mauve, finely pubescent, up to 6 cm. long, the slender portion of the tube 1–1.5 cm. long, the upper portion funnelform or campanulate, slightly oblique, the limb 3–4.5 cm. broad, the lobes rounded; capsules 2–3 cm. long, cylindric, glabrous (the apical calluses puberulent), usually 20-seeded.

Ruellia metallica Leonard, sp. nov.—Suffrutex, caulibus quadrangularibus, glabris vel angulis pilosulis; lamina foliorum oblongo-elliptica, acuminata, basi angustata, in petiolum decurrens, paullo undulata, supra glabra, subtus in costa et venis depresso-pilosula, subtus metallico-purpurea; petioli pilosi, pilis curvatis; flores in fasciculis terminalibus et axillaribus sessiles, bracteis supremis linearibus, saepe longissimis, inferioribus foliosis; bracteolae triangulares, glabrae vel parce puberulentae; calycis segmenta subulata, glabra vel parce puberulenta; corolla purpurascens, infundibuliformis, lobis suborbicularibus; stamina inclusa; capsulae clavatae, minute puberulentae; semina rubescenti-brunnea, plana, orbicularia, glabra vel margine puberulenta.

Suffrutescent, 50 cm. high or more; stems quadrangular, glabrous, or pilosulous on the angles; leaf blades oblong-elliptic, 5–15 cm. long, 1–6 cm. wide, acuminate, often curved toward the tip, narrowed at the base and decurrent on the petiole, entire or shallowly undulate, glabrous except the costa and veins beneath, these pilosulous with curved, appressed hairs, the lower surface often a metallic purple; petioles 5–15 cm. long, pilosulous with curved, appressed hairs; flowers borne in terminal and axillary fascicles; uppermost bracts linear, 2–6 cm. long, 1–5 mm. wide, the lower intergrading into leaves; bractlets triangular, 2–2.5 mm. long, 0.75 mm. wide at the base; calyx 7–8 mm. long, glabrous or bearing a few minute hairs, the tube 1 mm. long, the segments subulate, 0.5 mm. wide at the base; corollas purplish, 2.5 cm. long, sparingly and minutely pubescent, the lower half of the tube 1.5 mm. in diameter, the upper portion obconic, 5 mm. broad at the mouth, the limb 1–2 cm. broad, the lobes suborbicular, 5–8 mm. in diameter; stamens included, one filament of each pair 3 mm. long, the other 5 mm., all glabrous; anthers 1.5 mm. long, 0.5 mm. wide; ovary minutely puberulent; style 15 mm. long, glabrous or bearing a few minute hairs near the base; stigma lobes very unequal, one about 1 mm. long, the other vestigial; capsules 7–10 mm. long, 3 mm. broad, pointed at the apex, narrowed to a slender, solid base 5 mm. long and 1.25 mm. broad, minutely puberulent; retinacula 1.5 mm. long, bidentate or irregularly toothed at the apex; seeds reddish brown, orbicular, about 2 mm. in diameter, glabrous, or puberulent on the margins, mucilaginous when moistened.—Zent Farm, Prov. Limón, at sea level, May 2, 1903, *Cook & Doyle 456* (type in U. S. Nat. Herb., No. 474,307). Cuesta de La Vieja, *Biolley 64* (in part). Banana plantation at Limón, *Cook & Doyle 441*. Forests of Hacienda Victoria, Plains of Zent, *Pittier 16029*. Wet thicket, Finca Montecristo, Río Reventazón below El Cairo, Prov. Limón, 25 meters, *Standley & Valerio 48445*. Moist forest, La Tejona, north of Tilarán, Guanacaste, 600–700 meters, *Standley & Valerio 45880*. Playa Blanca, Golfo Dulce, *Manuel Valerio 474*.—NICARAGUA: Mosquito coast, *Schramm*. Sangsangta District, *Schramm 28, 58*.—PANAMA: Changuinola Valley, Province of Bocas del Toro, *Dunlap 380, 437, 461*. Cacao plantation in western Panama, *Stork 34½*. Readily distinguished from other Central American species by its sessile, fascicled flowers, the metallic luster of the lower surface of the leaf blades, and the long, narrow bracts of the inflorescence. In general appearance it must bear a close resemblance to *R. barbillana*, but that species has glabrous capsules and slightly larger flowers (3 cm. long).

Ruellia nudiflora var. **puberula** Leonard. Collected in Guanacaste, at 25–70 meters. Oaxaca, Guatemala, and Salvador. Herbs, 10–20 cm. high; stems ascending, branched, puberulent, the minute hairs mixed with longer, spreading ones, the younger stems rather densely pilose; leaf blades oblong-elliptic, 2–10 cm. long, 1–3 cm. wide, obtuse or rounded at the apex, gradually narrowed at the base and decurrent on the petiole, firm, undulate-crisped, gray-puberulent with minute, curved hairs, these interspersed with longer, spreading ones; petioles 1–3 cm. long; inflorescence of axillary, dichotomous cymes, with a flower in the forks; peduncles 1–8 cm. long, glandular-puberulent; bracts leaflike, 5–10 mm. long, 2–3 mm. wide, or occasionally much larger; pedicels 5–10 mm. long, or the one in the lowest fork becoming stout and 15–20 mm. long; calyx 15–30 mm. long, grayish-puberulent and ciliate, the segments linear, keeled, 1 mm. wide at the base; corolla 3–4 cm. long, the lower portion of the tube 10–12 mm. long and 1.5 mm. in diameter, the upper part abruptly enlarged and broadly funnelform or narrowly campanulate, the throat 15 mm. broad, the limb 3–3.5 cm. broad, the lobes rounded, undulate, often emarginate; capsule 15–18 mm. long, 4 mm. broad, puberulent.

Ruellia paniculata L. Waste places. Mexico to Colombia and Venezuela, and West Indies. Herbaceous or suffrutescent; stems up to 1 meter long, erect, ascending, or sometimes decumbent and rooting at the nodes, the pubescence a mixture of minute, grayish hairs and longer, glandular ones; petioles slender, 1–4 cm. long; leaf blades ovate to oblong-ovate, 3–17 cm. long, 1.5–6.6 cm. wide, obtuse or acute, abruptly narrowed at the base, glandular-pubescent, grayish-puberulent or glabrate; inflorescence axillary, the branches divaricate or ascending, dichotomous; bracts leaflike, glandular-pubescent, those subtending the flowers 2–10 mm. long and 1–4 mm. wide; calyx 1–1.5 cm. long, glandular-pubescent, the segments linear-subulate, unequal; corollas blue, finely pubescent, 2–3 cm. long, the lobes oval, 6–7 mm. long, 5 mm. wide; capsules cylindric, 10–13 mm. long, 2 mm. in diameter, erect, pointed, glabrous, 8-seeded; seeds flat, 2 mm. long and 1.5 mm. wide.

Ruellia Pittieri Lindau, Bull. Herb. Boiss. 6: 655. 1897. Cerro del Volcán, near Boruca, 1,200 meters, *Pittier 6743*. Forests of Cerro del Volcán and Santo Domingo de Golfo Dulce. Suffrutescent, the stems about 1 meter high, quadrangular, glabrous or puberulent; leaf blades ovate to oblong-elliptic, 6–21 cm. long, 1.5–6 cm. wide, acute or acuminate, narrowed at the base, entire or crenate-dentate, glabrous except the costa and veins of the lower surface, these puberulent, the cystoliths numerous; flowers borne in diffuse, axillary panicles, the peduncles up to 22 cm. long, quadrangular, narrowly winged, sparingly puberulent or glabrous, the cystoliths numerous; bracts up to 4 cm. long and 1.5 cm. wide, leaflike, rounded at the apex; bractlets triangular or subulate, about 1 mm. long; calyx about 4 mm. long, the segments subulate, sparingly puberulent; corollas 2 cm. long, puberulent, the tube slender, the lower portion 2 mm. in diameter, oblique above and 6 mm. in diameter at the throat, the lobes equal, obtuse, 8 mm. long, 5 mm. wide; style 15 mm. long, pubescent; capsules 13 mm. long, 4 mm. broad, acute at the apex, glabrous, 4-seeded, the sterile basal portion about 7 mm. long.

Ruellia stemonacanthoides (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 507. 1882. *Arrhostoxylum stemonacanthoides* Oerst. Vid. Medd. Kjoebenhavn 1854: 130. 1855. Cerro de Aguacate, 480 meters, *Oersted*. Forests, usually in wet situations. Campeche and British Honduras to Costa Rica. Suffrutescent, up to 3 meters tall; stems puberulent or glabrate; leaf blades oblong-ovate to oblong-lanceolate, 6–16 cm. long, 1.5–8 cm. wide, acuminate (the tip blunt, often minutely cuspidate), rounded or narrowed at the base, firm, entire, glabrous, the veins and costa of the lower surface puberulent; petioles 1–9 cm. long; inflorescence axillary, peduncled, dichotomous, sometimes a terminal panicle, the peduncles up to 17 cm. long, quadrangular, horizontal or slightly ascending, curved, the flowers more or less secund; bracts leaflike; calyx up to 1 cm. long, puberulent or glabrate, the segments linear-subulate; corollas purple, salverform, 3–4 cm. long, the lobes oval, about 9 mm. long and 8 mm. wide, shallowly emarginate; capsules 16 mm. long, glabrous, 12-seeded; seeds flat, 2.5 mm. in diameter.

Ruellia tetrastichantha Lindau in Pittier, Prim. 2: 300. 1900. *Corteza de venado*. Banks of Río Corozal, near Santo Domingo de Osa, *Tonduz 9984*. Wet forests of Costa Rica, Panama, and Colombia. Suffrutescent, 1–1.5 meters high; stems ascending, subquadrangular, minutely puberulent; leaf blades oblong-elliptic, 6–14 cm. long, 3–12 cm. wide, short-acuminate (the tip blunt), narrowed at the base and decurrent on the petiole, entire or undulate, glabrous except the costa and veins beneath, these puberulent, the lower surface with small, reddish, glandular dots, the cystoliths minute; petioles 1.5–2.5 cm. long, puberulent; flowers several, borne in terminal or lateral heads subtended by several leaflike bracts 2–5 cm. long and 1.5–2 cm. wide; peduncles 5–10 mm. long, the rachis conical, 5–12 mm. long, exposing (after the bracts, flowers, and fruits fall) vertical rows of conspicuous, corky scars; bractlets broadly triangular, obtuse, puberulent; pedicels 2–3 mm. long; calyx 4 mm. long, puberulent, with glandular dots, the segments narrowly triangular; corolla white, yellow, or occasionally red, 7–8 cm. long, puberulent, the lower portion of the tube slender, 3–5 mm. in diameter, the upper half obconic or subcylindric, 1–2 cm. broad at the mouth, the limb 2–3 cm. broad, the lobes oval or suborbicular, 10–15 mm. broad; stamens included; ovary puberulent and gland-dotted; style 6 cm. long, puberulent; capsules 15 mm. long, 5 mm. broad, pointed at the apex, narrowed to a solid base 2.5–3 mm. long and 3 mm. broad, puberulent, 8–10-seeded; seeds brown, flat, orbicular, 5 mm. in diameter.

Ruellia Tonduzii Lindau in Pittier, Prim. 2: 302. 1900. Punta Mala, Pacific coast, *Tonduz 6778*. Found on the Pacific coast at Punta Mala and Puerto Jiménez; also on low hills above Río Paquita and flood plains of Río Sándalo. Endemic. Stems obscurely quadrangular, puberulent or glabrate, with cystoliths; leaf blades oblong, 5–10 cm. long, 2–5 cm. wide, acuminate or obtuse, acute at the base and decurrent on the petiole, entire or shallowly crenate, both surfaces glabrous except the costa and veins beneath, these puberulent with curved hairs, the cystoliths slender and prominent; petioles slender, 0.5–1.5 cm. long; flowers few, borne in peduncled, dichotomous, axillary cymes; peduncles up to 9 cm. long, quadrangular, glabrous; bracts oblong, 5–18 mm. long, 1–3 mm. wide; bractlets linear-subulate, 1–1.5 mm. long; calyx 4–5 mm. long, puberulent or glabrate, the segments subulate; corollas lilac, 2–2.5 cm. long, obscurely pubescent, the lower half of the tube slender, 1 mm. in diameter, the upper half narrowly campanulate, 7 mm. broad at the mouth, the lobes ovate, about 7 mm. long and 5 mm. wide; style about 17 mm. long, sparingly puberulent; capsules 11–12 mm. long, 3 mm. broad, pointed at the apex, abruptly narrowed to a slender, solid base 5–6 mm. long and 1 mm. broad, glabrous; seeds flat, lenticular, 1.5 mm. in diameter.

SPATHACANTHUS Baill.

Shrubs or small trees; leaves usually large, oblong or elliptic, petiolate; flowers large, few, borne on small, terminal or lateral branches; bracts small; calyx spathaceous, valvate; corolla usually large, the tube salveriform, curved, the limb 2-lipped, the lobes subequal, rounded; stamens 4, didynamous; anther lobes parallel; ovules 2 in each locule; capsules large, glabrous.

Spathacanthus Hoffmanni Lindau, Bull. Herb. Boiss. 3: 370. 1895. Near Aguacate, *Hoffmann 842*. Forests on the slopes of the central cordillera. Trees, up to 6 meters high; branches glabrous; leaf blades oblong, up to 28 cm. long and 11 cm. wide, acuminate, narrowed at the base and decurrent on the petiole, glabrous, both surfaces bearing numerous small cystoliths; petioles about 5 cm. long; flowers borne in short racemes, the rachis 1–4 cm. long; bracts and bractlets narrowly triangular, 1–3 mm. long, acute; spathe segments 3 cm. long, connate below, the lobes ovate, short-acuminate, 13 mm. wide; corolla 6–7 cm. long, white, glabrous, the tube 5 mm. in diameter at the base, 2 cm. at the mouth, the limb 4 cm. broad, the lobes rounded; stamens included; style about equaling the corolla; capsules 6–6.5 cm. long, glabrate, woody, 4-seeded; seeds flat, ovate, about 10 mm. long, minutely roughened.

STREBLACANTHUS Kuntze

Herbs (sometimes shrubby); leaves petioled; flowers borne in lax, terminal and axillary spikes; bracts narrow; calyx segments 4, narrow, equal; corolla tube expanded at the base, gradually narrowed to a slender throat, the limb 2-lipped, spreading, the upper lip 2-lobed, the lower 3-lobed; stamens 2, attached to the throat of the corolla, the filaments short, the anther cells unequal, widely separated, one usually fertile and calcarate at the base, the other often abortive; staminodes none; style filiform; capsules slender, sterile and solid from middle to base, the upper portion flat, ovate, 2–4-seeded, the seeds lenticular.—Two species not occurring in Costa Rica have been described, one from Panama the other from Bolivia.

Limb of the corolla 15–20 mm. broad.............*S. macrophyllus.*
Limb of the corolla 10 mm. broad or less.
  Superior anther lobe fertile.......................*S. longiflorus.*
  Superior anther lobe sterile......................*S. monospermus.*

Streblacanthus longiflorus Cufodontis, Archivio Bot. 10: 48. 1934. Description adapted from the original. Type collected 12 km. from the mouth of Río Reventazón, Atlantic coast, *Cufodontis 336*. A shrub, up to 2 meters high; stems subterete, subquadrangular toward the tip, pilose in 2 lines; leaf blades ovate-lanceolate, up to

20 cm. long and 8 cm. wide, acuminate, unequally narrowed at the base, glabrous, or the younger ones sparingly setulose, the cystoliths inconspicuous; petioles 4–7 cm. long; flowers borne in a terminal, glandular-villous spike about 6 cm. long; bracts linear-lanceolate, 25 mm. long, 3 mm. wide, obtuse; bractlets subulate, 1 cm. long; calyx segments subulate; corollas pale lilac, the tube 25 mm. long, 3 mm. in diameter at the base, gradually narrowed to 1 mm. at the mouth, the lobes of the limb about equal, ovate, rounded, about 5 mm. long and 3 mm. wide, the upper obsoletely bifid(?); filaments 2 mm. long, the superior anther lobe subglobose, fertile, the inferior lobe distant, smaller and apparently sterile; ovary villous, 2-ovuled.

Streblacanthus macrophyllus Lindau in Pittier, Prim. 2: 306. 1900. Forests along Río Zhorquín, *Pittier 8547.* Forests of southern Costa Rica. Endemic. Stems glabrous, or pubescent in 2 lines toward the tip; leaf blades oblong-ovate or elliptic, up to 25 cm. long and 10 cm. wide, acuminate, narrowed at the base, glabrous, or especially in the upper leaves the costa and margins more or less hirsute; spikes 1 or 2, about as long as the leaves, softly pilose, the hairs brownish, glandular; bracts oblong, up to 15 mm. long, 2–3 mm. wide, rounded at the tip; bractlets 6 mm. long, 1 mm. wide, acute; calyx segments 4 mm. long, 1 mm. wide, linear, minutely glandular-pubescent; corollas purplish white, pubescent, the tube 20 mm. long and 4 mm. in diameter at the inflated base, 1.5 mm. at the mouth, the upper lip 8 mm. long, 2-lobed, the lobes 6 mm. long, 3.5 mm. wide, acute, the lower lip 3-lobed, the middle lobe 9 mm. long and 6 mm. wide, the lateral ones 8 mm. long and 5 mm. wide, all rounded; anthers exserted, 1-celled, obtuse; styles 22 mm. long.

Streblacanthus monospermus Kuntze, Rev. Gen. 2: 498. 1891. South of San José, *Kuntze.* Wet forests of southern Costa Rica. An herb, up to 1 meter high; stem simple, erect, terete, fleshy, pubescent in 2 lines with small, curved hairs; leaf blades oblong-ovate to oblong-elliptic, up to 18 cm. long and 7.5 cm. wide, acuminate (the tip blunt), narrowed at the base, glabrous; petioles up to 5 cm. long, glabrous; spikes terminal or borne in the upper axils, up to 25 cm. long, soft-pilose, the hairs glandular, about 1 mm. long; bracts lanceolate, 1.5–2.5 cm. long, 3–4 mm. wide, acute to obtuse at the tip, glandular-pilose; bractlets similar but smaller; calyx segments lanceolate, 5–6 mm. long, glandular-pilose; corolla white, rather sparingly pilose, the tube 2–3 cm. long, about 3 mm. in diameter at the base, 1 mm. at the mouth, the limb 7–8 mm.

broad; capsules 2–2.5 cm. long and 8 mm. wide, glandular-pilose, 4-seeded, long-stipitate, the upper seed-bearing portion flattened and ovate; seeds brown, about 5 mm. in diameter, glabrous, the edges roughened.

TETRAMERIUM Nees

Fruticose or suffruticose; stems usually branched, the pubescence often disposed in 2 opposite, lateral lines; leaves sessile or petiolate, ovate to linear, entire, glabrous or pubescent; flowers borne in terminal or axillary, 4-angled spikes, the bracts conspicuous, usually closely imbricate, opposite, ciliate, mucronate; calyx 4–5-parted, the segments ciliate; corollas tubular-infundibuliform, the tube straight or slightly curved, the upper lip entire or emarginate, the lower 3-lobed, the lobes nearly equal; stamens 2, included; anther sacs slightly converging toward the apex, one a little longer than the other; capsules obovate, apiculate, contracted below into a solid base, usually hispid and 4-seeded, sometimes 2-seeded; seeds flattened, tuberculate or muriculate.—A genus of about 23 species, extending from southern United States to northern South America. Many of the species frequent dry situations at rather low altitudes.

Bracts rotund-ovate to ovate, 7-nerved . . . . *T. nervosum.*

Bracts elliptic, 3–5-nerved . . . . *T. hispidum.*

Tetramerium hispidum Nees. Dry, open places throughout tropical America. Herbs, up to 30 cm. high; stems terete, brittle, pilosulous or glabrate; leaf blades ovate, 1–2.5 cm. long, 0.5–1.2 cm. wide, obtuse, rounded at the base, pilosulous; petioles up to 8 mm. long, slender, pilose; flowers borne in terminal spikes up to 9 cm. long and about 8 mm. in diameter, the rachis glabrous or sparingly pilose; bracts elliptic, about 7 mm. long and 4 mm. wide, acute, ending in a mucro 0.5 mm. long, ciliate, 3–5-nerved, closely imbricate; bractlets narrowly lance-aristate, 2.5 mm. long, pilose at the tip; calyx segments similar to the bractlets but slightly longer; corolla 1 cm. long, white, glabrous, the tube slender, the lips 5 mm. long, the upper one entire, the lower 3-lobed, the lobes elliptic, 3 mm. long; capsules 4.5 mm. long, pubescent or glabrate; seeds papillose.

Tetramerium nervosum Nees. Wet forests, Central America to northern South America. Found at 600 meters in Costa Rica, in the vicinity of Los Ayotes (Guanacaste) and Orotina. Herbs; stems sometimes glabrous, but usually evenly pubescent or the hairs arranged in 2 lines; leaf blades ovate or ovate-lanceolate, up to 4 cm. long and 3 cm. wide, acuminate or acute, subcordate to obtuse at the base, thin, sparingly pubescent on both surfaces; petioles up to 2 cm. long, sparingly pubescent or glabrous; flowers borne in terminal spikes up to 4 cm. long; bracts rotund-ovate to ovate, 6–10 mm. long, 5–7 mm. wide, short-acuminate to cuspidate at the apex, rounded and abruptly contracted below the middle into a subpetiolate base, 7-nerved, hispid-ciliate, the hairs up to 2 mm. long; bractlets linear-lanceolate, 2–3 mm. long; calyx lobes 4, linear-lanceolate, 2–3 mm. long, hispid-ciliate; corolla 10 mm. long, essentially glabrous, purplish white, the lips about 5.5 mm. long, the upper one subemarginate; capsules 5 mm. long, 1.8 mm. broad, hirsute near the apex, 4-seeded.

THUNBERGIA Retz.

Herbaceous or woody vines (occasionally shrubs) with large, 2-bracted flowers, these solitary in the axils of the leaves, or in terminal racemes; calyx short, annular, usually with many teeth; corolla tube oblique, the limb 5-lobed; stamens 4, didynamous; ovary 4-ovuled; capsules coriaceous, globose, abruptly beaked.—An Old World genus, widely introduced into tropical America. Other species than the four here described are likely to occur in gardens of Costa Rica.

Petioles winged; corollas orange or yellow, with a dark purple eye. *T. alata.*
Petioles not winged.
  Vines; flowers pure white.......................... *T. fragrans.*
  Erect or scandent shrubs; flowers usually blue or violet.
    Leaf blades thin, small, usually 2–4 cm. long; erect shrubs. *T. erecta.*
    Leaf blades firm, usually 7–13 cm. long; scandent shrubs. *T. Vogeliana.*

Thunbergia alata Bojer. *Ojo de poeta.* Roadsides and waste places. Tropical America generally. Naturalized from eastern Africa. A trailing, pubescent vine up to 1 meter long; leaf blades ovate to triangular-ovate, 2–8 cm. long, remotely few-toothed to entire, acute, cordate or hastate at the base; petioles winged; flowers axillary, the slender peduncles longer than the petioles; bracts ovate-lanceolate, about 1.5 cm. long, acute to acuminate; calyx shorter than the bracts; corolla 2.5–4 cm. long, yellow or occasionally white, usually with a purple eye; capsules depressed-globose, pubescent, 0.5–1 cm. in diameter, the stout beak about 1 cm. long. In cultivated plants a number of color forms may appear, varying from white to yellow or bright orange, with or without the purple eye.

Thunbergia erecta (Benth.) T. Anders. Cultivated or found as an escape in tropical America. Originally from Cape Coast, Africa. Erect shrubs, up to 3 meters high; stems quadrangular, narrowly winged, glabrous, or the nodes pubescent; petioles 5–10 mm. long; leaf blades oblong-ovate or oblong-lanceolate, up to 7 cm. long and 3.5 cm. wide, but usually much smaller (2–4 cm. long), thin, glabrous, entire or sinuately toothed; flowers solitary, axillary; peduncles up to 2 cm. long, glabrous; bracts oblong, oblique, 1–2 cm. long, 5–8 mm. wide, obtusish, glabrous or minutely pubescent at the tip, faintly striate; calyx teeth 8–12, small (1–4 mm. long); corollas 4–8 cm. long, deep violet with a white or yellowish throat, or the entire corolla pure white.

Thunbergia fragrans Roxb. Roadsides, thickets, and waste places; cultivated in tropical America generally. Native of India. A slender vine, up to 2 meters long; stem grooved, minutely strigose or glabrate; petioles slender, up to 4 cm. long; leaf blades ovate to ovate-lanceolate, 4–11 cm. long, 1.5–6 cm. wide, acuminate, acute, or occasionally obtuse, at the base subtruncate, cordate, or hastate, entire or remotely few-toothed toward the base, thin, minutely strigose or glabrate; flowers axillary; peduncles up to 7 cm. long; bracts ovate to ovate-lanceolate, 1.5–2 cm. long, 6–13 mm. wide, acute or acuminate, pubescent; flowers pure white, the lobes subtruncate at the apex, about as long as the tube; capsules depressed-globose, about 8 mm. in diameter, puberulent, tipped by a stout, subulate beak 1–1.5 cm. long.

Thunbergia Vogeliana Benth. Occasionally cultivated in tropical America. The type was collected on Fernando Po, Africa. A scandent shrub, up to 2 meters high; branches glabrous, or finely pubescent at the nodes; petioles about 5 mm. long; leaf blades oblong, up to 13 cm. long and 5 cm. wide, acuminate, narrowed at the base, firm, subscabrous or glabrous, serrulate or entire; flowers solitary; peduncles up to 2.5 cm. long, densely brownish-pubescent at the base; bracts white, ovate, 2–2.5 cm. long, about 1 cm. wide, obtuse, thick; calyx teeth (about 12) 8 mm. long; corollas about 4 cm. long, the limb dark blue, the throat yellow within and white without.

TRICHANTHERA HBK.

Shrubs or trees; leaves petioled, ovate to oblong, entire or undulate, the cystoliths numerous; inflorescence a terminal panicle or corymb, usually dense and many-flowered; bracts small, triangular; calyx segments 5, obtuse; corollas regular, 5-lobed, tomentose, campanulate; stamens 4, exserted, didynamous, the anthers bearded, the basal lobes rounded; capsules 4-seeded.—A single species occurs in Central America, an additional one in Colombia.

Trichanthera gigantea (Humb. & Bonpl.) Nees. *Palo de agua.* A common tree in moist forests. Costa Rica to Venezuela, Colombia, and Peru. Shrubs or trees, up to 5 meters high; branchlets quadrangular, the angles rounded, the tips brown-tomentose; leaf blades ovate to oblong, up to 26 cm. long and 14 cm. wide, acuminate, narrowed at the base, entire or undulate, glabrous except the costa and veins, these prominent, more or less pubescent; petioles up to 5 cm. long; panicles 5–15 cm. long, 4–5 cm. broad, brown-tomentose, the flowers secund; bracts 3 mm. long; calyx 10–12 mm. long, brown-tomentose, the lobes erect, oblong, 7–10 mm. long, 5 mm. wide; corollas 3–4 cm. long, red and glabrous proximally, yellowish and silky-tomentose distally, red and glabrous within, the tube 1–1.5 cm. long, 6 mm. broad below, campanulate above, the limb 2–3 cm. broad, the lobes oblong to oblong-ovate, 10 mm. long; styles 4–5 cm. long, glabrous; capsules oblong, 1.5–2 cm. long, 0.5 cm. broad, obtuse at the apex, silky with closely appressed hairs, 1–4-seeded; seeds lenticular, glabrous, 3–4 mm. in diameter.

PLANTAGINACEAE. Plantain Family

Reference: Pilger, Pflanzenreich IV. 269. 1937.

In Central America this family is represented by a single genus which contains the vast majority of the plants of the family.

PLANTAGO L. Plantain

Low, annual or perennial herbs, acaulescent in the Central American species, the leaves often forming a basal rosette, entire or dentate, usually with longitudinal nerves; flowers small, greenish, in solitary heads or spikes at the ends of the naked scapes; calyx 4-parted, the segments equal or 2 of them larger; corolla salverform, the 4 lobes spreading or reflexed; stamens 4 or 2, inserted in the tube or throat of the corolla, the anthers versatile, 2-celled, longitudinally dehiscent; style simple, filiform; ovary sessile, superior, usually 2-celled; fruit capsular, circumscissile at or below the middle, the seeds 1 or more in each cell.—Probably no other species occur in Central America.

Plantago hirtella HBK. *Llantén.* *P. Galeottiana* Dcne. Common in pastures and on open banks of the central region, mostly at 1,000–2,000 meters. Mexico to Brazil and Bolivia. Perennial; leaves oblanceolate to narrowly elliptic or obovate-elliptic, acute or obtuse, attenuate to the base, 5–7-nerved, entire or nearly so, sparsely or densely villous with whitish hairs; scapes 12–30 cm. long, villous, the spikes dense, mostly 4–10 cm. long; corolla lobes erect in fruit. Pilger recognizes several varieties and forms, none of which appear to be of great importance. He refers some Costa Rican collections to f. *minor* Pilger.

Plantago lanceolata L. Well established in pastures on the upper slopes of the volcanoes of Turrialba and Irazú. Native of the Old World, but generally naturalized in temperate regions of America. Perennial or biennial, pilose; leaves narrowly oblong-lanceolate, entire, acute or acuminate, gradually attenuate to the petiole, 3–5-nerved; scapes slender, striate, often 30 cm. long or even more; spikes very dense, at first ovoid, becoming cylindric, 1–10 cm. long; capsule with only 2 seeds. In the United States both this and the following species are often troublesome weeds.

Plantago major L. *Llantén.* Naturalized in grassy places about San José. Native of the Old World; naturalized generally in temperate regions of America. Perennial, glabrous or inconspicuously pubescent; leaves petiolate, often lying flat upon the ground or nearly so, ovate or broadly ovate, entire or coarsely dentate, 3–11-nerved; scapes mostly less than 30 cm. high, the spikes linear-cylindric, dense, 5–20 cm. long; capsule with 5–16 seeds.

RUBIACEAE. Coffee Family

Reference: Standley, N. Amer. Fl. 32: 3–300. 1918–1934.

Herbs, shrubs, or trees, sometimes scandent, often armed with spines; leaves opposite or verticillate, stipulate, simple and entire, pinnatifid in one genus; inflorescence various, the flowers perfect or rarely unisexual, usually regular and symmetric; calyx tube (hypanthium) adnate to the ovary; corolla gamopetalous, the lobes in bud valvate, imbricate, or contorted; stamens usually as many as the corolla lobes and alternate with them, the anthers 2-celled; ovary 1–10-celled, the ovules 1–many in each cell; fruit capsular, baccate, drupaceous, or of dehiscent or indehiscent cocci.—One of the largest families of tropical America, well represented in Costa Rica. A considerable number of additional genera are known from other parts of Central America, and a few of them may well be represented in Costa Rica.

Key to the tribes and genera

Ovules more than 1 in each cell of the ovary.
  Fruit fleshy.
    Corolla lobes valvate........................VI. *Mussaendeae.*
    Corolla lobes imbricate or contorted...........VII. *Gardenieae.*
  Fruit dry.
    Flowers arranged in compact, globose heads; shrubs or trees, armed with recurved spines................V. *Naucleeae.*
    Flowers not in compact, globose heads.
      Seeds winged or appendaged, vertically imbricate. IV. *Cinchoneae.*
      Seeds exalate or, if winged, horizontal.
        Corolla lobes imbricate or contorted....III. *Rondeletieae.*
        Corolla lobes valvate.
          Seeds horizontal, usually very numerous; stipules entire or biparted; large shrubs or trees with usually large leaves...........................I. *Condamineae.*
          Seeds imbricate, vertical, usually few; stipules often setose-laciniate; herbs or small shrubs with small leaves..........................II. *Oldenlandieae.*
Ovules solitary.
  Seed pendulous, the radicle superior; shrubs or trees.
    Flowers in compact, globose heads..............V. *Naucleeae.*
    Flowers never in compact, globose heads.
      Stamens inserted in the throat of the corolla. VIII. *Guettardeae.*
      Stamens inserted at the base of the corolla tube. IX. *Chiococceae.*
  Seed ascending, the radicle inferior; plants often herbaceous.
    Corolla lobes contorted; shrubs or trees............X. *Ixoreae.*
    Corolla lobes valvate.
      Ovules basal, attached at the base of the cell; mostly shrubs or trees.
        Ovary 1-celled, or 2-celled but with a very thin septum, the fruit 1-seeded......................XIII. *Coussareae.*
        Ovary 2-celled, or the cells rarely more numerous, the septum thick.

Stamens usually inserted in the base of the corolla tube; flowers often dioecious..........XII. *Anthospermeae.*

Stamens usually inserted in the throat of the corolla; flowers perfect....................XI. *Psychotrieae.*

Ovules lateral, attached to the septum.

Stipules neither foliaceous nor setiferous; trees or large shrubs; flowers confluent to form a dense head. XIV. *Morindeae.*

Stipules either foliaceous (the leaves then appearing verticillate and estipulate) or setiferous; herbs or low shrubs; flowers never confluent into a true head.

Stipules setiferous..................XV. *Spermacoceae.*

Stipules foliaceous, resembling the leaves..XVI. *Galieae.*

I. CONDAMINEAE

Calyx lobes dissimilar, one of them expanded into a large, colored, bractlike limb..................................*Pogonopus.*

Calyx lobes all similar, none of them expanded.

Anthers dehiscent by longitudinal slits, dorsifixed; inflorescence axillary....................................*Chimarrhis.*

Anthers dehiscent by terminal pores, basifixed; inflorescence terminal......................................*Rustia.*

II. OLDENLANDIEAE

Seeds angulate; plants herbaceous...................*Oldenlandia.*

Seeds crateriform or concavo-convex; small shrubs...*Arcytophyllum.*

III. RONDELETIEAE

Corolla lobes contorted.

Corolla tube very short, shorter than the lobes.

Corolla glabrous within, 4-parted; filaments not appendaged. *Deppea.*

Corolla villous within, 5-parted; filaments appendaged at the base.....................................*Elaeagia.*

Corolla tube elongate, several times as long as the lobes. *Lindenia.*

Corolla lobes imbricate.

Calyx lobes dissimilar, one of them expanded into a large, petiolate, colored limb...............................*Warszewiczia.*

Calyx lobes all similar, none of them expanded into a petiolate limb.
  Seeds very large, horizontal .... *Sickingia.*
  Seeds small or minute.
    Corolla salverform or funnelform .... *Rondeletia.*
    Corolla cylindric-campanulate.
      Corolla barbate in the throat .... *Holtonia.*
      Corolla glabrous within .... *Oregandra.*

IV. CINCHONEAE

Corolla lobes valvate.
  Plants scandent, herbaceous .... *Manettia.*
  Plants erect, woody.
    Flowers 4-parted; capsule subglobose .... *Bouvardia.*
    Flowers 5-parted; capsule oblong to clavate..
      Capsule splitting from below upward .... *Cinchona.*
      Capsule splitting from the apex downward.
        Capsule loculicidal .... *Macrocnemum.*
        Capsule septicidal .... *Ladenbergia.*

Corolla lobes imbricate or contorted.
  Calyx lobes dissimilar, one of them expanded into a large, white, petiolate limb .... *Calycophyllum.*
  Calyx lobes all similar, none of them expanded into a petiolate limb.
    Corolla lobes contorted.
      Calyx tubular, deciduous; seeds not barbate ..... *Cosmibuena.*
      Calyx parted to the base, or none; seeds barbate ..... *Hillia.*
    Calyx lobes imbricate.
      Anthers sessile or nearly so; plants epiphytic; corolla red. *Ravnia.*
      Anthers borne on long filaments; plants terrestrial; flowers not red.
        Corolla symmetric, the tube very slender, the limb 4–5-lobate .... *Exostema.*
        Corolla asymmetric, the tube enlarged, the limb 6–8-lobate. *Coutarea.*

V. NAUCLEEAE

A single genus in Costa Rica .... *Uncaria.*

VI. MUSSAENDEAE

Inflorescences terminal.

Inflorescence a spikelike panicle; leaves membranaceous; ovary 2–4-celled .... *Gonzalagunia.*

Inflorescence a thyrsoid panicle; leaves coriaceous; ovary 4–6-celled .... *Isertia.*

Inflorescences axillary.

Leaves finely lineolate between the veins; inflorescence not capitate.

Calyx subtruncate, very shallowly and irregularly lobate. *Nothophlebia.*

Calyx spathaceous or conspicuously and regularly lobate.

Calyx spathaceous or lobate, the lobes not foliaceous; leaves often pinnatifid .... *Pentagonia.*

Calyx deeply lobate, the lobes subfoliaceous; leaves entire. *Sommera.*

Leaves not lineolate; inflorescence usually capitate or cymose-capitate.

Plants herbaceous, usually prostrate or nearly so, not scandent; ovary 2-celled .... *Coccocypselum.*

Plants woody or suffrutescent, sometimes scandent.

Ovary 3–5-celled; plants scandent .... *Sabicea.*

Ovary 2-celled; plants erect .... *Xerococcus.*

VII. GARDENIEAE

Corolla lobes imbricate.

Ovary 4–5-celled .... *Hamelia.*

Ovary 2-celled .... *Hoffmannia.*

Corolla lobes contorted.

Seeds minute, the testa foveolate .... *Bertiera.*

Seeds large, the testa smooth or fibrous.

Corolla somewhat irregular, curved in bud .... *Posoqueria.*

Corolla regular, the buds not curved.

Flowers perfect.

Flowers terminal or terminal and axillary.

Flowers in cymes .... *Tocoyena.*

Flowers solitary or fasciculate .... *Randia.*

Flowers axillary.

Corolla tube villous in both throat and base; stigma attenuate................................*Genipa.*

Corolla tube villous in the throat or the base, but not in both; stigma not attenuate.

Ovary 2-celled; native plants................*Randia.*

Ovary 1-celled; cultivated plants...........*Gardenia.*

Flowers dioecious.

Stipules forming a conic cap, deciduous above a circular slit.....................................*Duroia.*

Stipules free or united only near the base, not dehiscent by a circular slit.

Staminate flowers lateral; plants usually armed with spines...................................*Randia.*

Staminate flowers terminal; plants unarmed .. *Alibertia.*

VIII. GUETTARDEAE

Fruit separating into 2 cocci at maturity; calyx lobes 4–5, persistent; corolla lobes not imbricate.........................*Machaonia.*

Fruit drupaceous, not separating into cocci at maturity.

Corolla lobes valvate or but slightly imbricate.

Corolla lobes corniculate-appendaged near the apex; basal lobes of the anthers acute or attenuate..............*Chomelia.*

Corolla lobes not appendaged; basal lobes of the anthers obtuse. *Anisomeris.*

Corolla lobes strongly imbricate, 1 or 2 of them exterior. *Guettarda.*

IX. CHIOCOCCEAE

A single genus in Costa Rica..........................*Chiococca.*

X. IXOREAE

Bractlets connate, calyx-like; calyx usually truncate........*Coffea.*

Bractlets distinct, not calyx-like; calyx lobate...............*Ixora.*

XI. PSYCHOTRIEAE

Inflorescence an involucrate, usually solitary head; heads sometimes branched in *Cephaelis.*

Plants creeping herbs................................*Geophila.*

Plants erect shrubs..................................*Cephaelis.*

Inflorescence not involucrate or rarely so, not a single involucrate head.

Carpels of the fruit laterally compressed, the fruit didymous; plants low herbs . . . . *Declieuxia.*

Carpels of the fruit not laterally compressed; plants mostly trees or shrubs.

Seeds with an inrolled ventral surface; stipules pectinate-lobate or with setiform, dorsal appendages . . . . *Rudgea.*

Seeds not with an inrolled ventral surface; stipules entire or bilobate.

Corolla tube straight, not gibbous at the base; branches of the inflorescence usually green . . . . *Psychotria.*

Corolla tube elongate, more or less curved, gibbous at the base; branches of the inflorescence usually pale or red or yellow . . . . *Palicourea.*

XII. ANTHOSPERMEAE

A single genus in Costa Rica . . . . *Gomozia.*

XIII. COUSSAREAE

Seeds vertical; ovules connate, borne upon a common basal column. *Coussarea.*

Seeds horizontal; ovules separate in a 1-celled ovary, collateral, basal. *Faramea.*

XIV. MORINDEAE

A single genus in Central America . . . . *Morinda.*

XV. SPERMACOCEAE

Fruit not separating into cocci, the whole fruit circumscissile. *Mitracarpus.*

Fruit separating into cocci, these not circumscissile.

Cocci indehiscent.

Cocci 3–4 . . . . *Richardia.*

Cocci 2.

Calyx lobate, the lobes elongate-subulate; cocci separating from a persistent axis . . . . *Crusea.*

Calyx 2–10-dentate; fruit without a persistent axis . . *Diodia.*

Cocci, at least one of them, dehiscent.

Cocci opening only at the base; flowers axillary . . . . *Hemidiodia.*

Cocci opening at the apex.
  Cells of the fruit alike, both opening .... *Borreria.*
  Cells of the fruit dissimilar, one opening, the other remaining closed .... *Spermacoce.*

XVI. GALIEAE

Calyx lobes developed, lanceolate; introduced plants.... *Sherardia.*
Calyx lobes obsolete; native plants.
  Flowers surrounded by a calyx-like involucre......... *Relbunium.*
  Flowers not involucrate.
    Leaves opposite.................................. *Didymaea.*
    Leaves verticillate.............................. *Galium.*

ALIBERTIA A. Rich.

Shrubs or trees; leaves usually coriaceous; stipules acute, connate at the base; flowers small, terminal, sessile, dioecious, white, the staminate fasciculate, the pistillate usually solitary; hypanthium hemispheric or globose, the calyx short or tubular, truncate or dentate; corolla coriaceous, salverform, the lobes contorted; ovary 2–8-celled, the ovules few or numerous in each cell; fruit baccate, usually rather large, the large seeds compressed.—No other species are found in North America.

Alibertia edulis (L. Rich.) A. Rich. *Trompillo, Madroño.* Forests and thickets of the Pacific tierra caliente; probably also on the Atlantic coast. Mexico to West Indies and the Amazon Basin. Usually a shrub or 4 meters or less, almost glabrous; stipules lance-triangular or deltoid, 8–15 mm. long, acute or acuminate; leaves short-petiolate, lance-oblong or ovate-oblong, 6–20 cm. long, usually short-acuminate, acute to rounded at the base, commonly barbate beneath in the axils of the nerves, otherwise glabrous; corolla 2.5 cm. long, minutely sericeous outside, the lobes acute or acuminate; calyx denticulate; fruit globose, yellowish, 2.5 cm. in diameter. Boys often use the fruits, with a stick thrust through them, as tops, hence the name *trompillo*. The leaves of seedling plants, often found abundantly in the forest, are narrower than those of adult plants, and handsomely colored with pink or purple. The fruits are reported edible, but they can not be very palatable.

ANISOMERIS Presl

Shrubs or small trees, often with spinose branchlets; stipules acuminate, deciduous; flowers small, white or yellowish, generally in axillary, pedunculate cymes, rarely solitary; calyx 4-lobate, the lobes usually elongate, equal or unequal, persistent; corolla salverform or funnelform, with a slender tube, the limb 4-lobate, the lobes unappendaged, valvate or slightly imbricate; stamens 4, the anthers dorsifixed, sessile; ovary 2-celled, the cells 1-ovulate; fruit small, drupaceous, with a single 2-celled stone.—A few other species are known from Central America.

Anisomeris microloba (Donn. Smith) Standl. Field Mus. Bot. 4: 293. 1929. *Chomelia microloba* Donn. Smith, Bot. Gaz. 31: 114. 1901. Forests of Santo Domingo de Golfo Dulce, *Tonduz 7048* (*9874*). Known only from the original collection. An unarmed shrub; stipules 3–4 mm. long, deltoid, cuspidate; leaves short-petiolate, elliptic-oval to ovate-oblong, 5–10 cm. long, obtusely short-acuminate, rounded or very obtuse at the base, short-barbate beneath in the axils of the nerves, otherwise glabrous; cymes axillary, few–many-flowered, pedunculate, the flowers sessile or subsessile; calyx lobes minute, obtuse; corolla strigillose outside, the tube 8–10 mm. long, the lobes ovate, obtuse.

Anisomeris sylvicola Standl. N. Amer. Fl. 32: 225. 1934. *Chomelia sylvicola* Standl. Journ. Wash. Acad. 18: 182. 1928. Wet forest, Yerba Buena, northeast of San Isidro, Prov. Heredia, 2,000 meters, *Standley & Valerio 49196*. Known only from the original collection. A glabrous shrub; stipules ovate-oval, 3 mm. long, obtuse; leaves slender-petiolate, the blades elliptic-oblong, 6.5–8 cm. long, 2–3 cm. wide, attenuate to an obtuse apex, acute and decurrent at the base, subcoriaceous, domatiate beneath in the axils of the nerves; inflorescence terminal, cymose-paniculate, rather few-flowered, on a peduncle 2 cm. long, the slender pedicels 10–12 mm. long; fruit obovoid, 18 mm. long, 7 mm. thick, acute at the base, 2-celled; calyx persistent, cupular, 2 mm. long, undulate. It is fairly certain that this plant does not belong to the genus *Anisomeris*, although its relationship is apparently with *Guettarda*, *Chomelia*, etc. Until flowering material is available, the plant's true affinities must remain uncertain.

ARCYTOPHYLLUM Schum.

Small shrubs, erect or prostrate; leaves crowded and often densely imbricate, very small, thick-coriaceous; stipules entire, bifid, or setose; flowers small, solitary and axillary or in small cymes; hypanthium globose or turbinate; calyx 4-lobate, the lobes erect, remote; corolla funnelform or salverform, with a short or elongate tube, the lobes valvate; ovary 2-celled, the ovules few; fruit capsular, turbinate or globose, small; seeds concavo-convex, punctate.—No other species are known in Central America. The genus probably should be united with *Houstonia*, since the only differences between the two groups seem to be habital, and even those are inconstant.

Arcytophyllum lavarum Schum. *Mallostoma lavarum* Donn. Smith. Dense, low thickets of the higher mountain slopes, especially on the central volcanoes, at 2,400–3,150 meters. Adjacent Panama. A very densely branched shrub, usually less than a meter high, glabrous except on the corolla; leaves broadly ovate to ovate-oblong, 4–6 mm. long, 2–3 mm. wide, rounded or very obtuse at the apex, contracted into a short petiole, paler beneath; flowers in dense, small, terminal cymes, short-pedicellate; calyx lobes broadly ovate, obtuse or acute, with 1 or more setae between each pair; corolla 4–5 mm. long, the lobes ovate, obtuse, white-villous within; capsule subglobose, 1.5–2 mm. long. One of the characteristic plants of the wet, moss-covered thickets about the lake on Poás, and in other similar localities.

Arcytophyllum muticum (Wedd.) Standl. Paramos of Cerro de Las Vueltas, 3,000 meters; probably also on Cerro de La Muerte. Colombia. A small, prostrate shrub; leaves sessile, lance-oblong, obtuse, muticous, coriaceous, glabrous; flowers terminal, solitary; calyx lobes obovate-oblong, obtuse; corolla white. In North America this species (unknown from the region when the Rubiaceae of the *North American Flora* was published) is known only from sterile specimens collected by Juvenal Valerio and the writer. It is a characteristic species of the Colombian paramos.

BERTIERA Aubl.

Slender shrubs or small trees; leaves petiolate or sessile, membranaceous; stipules connate into a bifid sheath; flowers small, white, cymose, the cymes arranged in terminal, pedunculate panicles; calyx 5-dentate or truncate, persistent; corolla funnelform, usually sericeous, the limb 5-lobate, the lobes short, ovate, acute, contorted; ovary 2-celled, the ovules numerous; fruit baccate, globose, fleshy; seeds numerous, very small, angulate, foveolate.—One other Central American species has been described from Panama.

Bertiera angustifolia Benth. Bot. Voy. Sulph. 103. 1845. Cocos Island, *Barclay*. Also in Panama. A shrub of 3 meters, the branches pilose-strigose; stipules 10–18 mm. long; leaves sessile or nearly so, oblong-lanceolate, 10–12 cm. long, acute or attenuate, rounded or obtuse at the base, almost glabrous above, sericeous beneath, especially on the nerves; panicles 6–11 cm. long, the flowers secund, sessile, the linear bracts 6–16 mm. long; fruit globose, 3–3.5 mm. in diameter.

Bertiera guianensis Aubl. In forest or thickets of the Atlantic tierra caliente. Southern Mexico to Bolivia and Amazonian Brazil. A shrub of 2–4 meters; stipules 5–10 mm. long; leaves short-petiolate, 8–17 cm. long, acute or acutish at the base; panicles narrow, elongate, the bracts linear, 6 mm. long or less; corolla 5–7 mm. long; fruit blue, 10-costate when dried, 3.5–4 mm. in diameter.

BORRERIA Meyer

Low, annual or perennial herbs, rarely suffrutescent; stipules united with the petioles into a setiferous sheath; flowers small, usually sessile in the leaf axils or in terminal heads; sepals 2 or 4, equal or unequal, often with interposed teeth; corolla very small, funnelform, the limb 4-lobate; stamens usually attached in the throat of the corolla; fruit a coriaceous or membranaceous capsule, 2-celled, the cells septicidal; seeds 1 in each cell.—A few other species are known from Central America. The plants usually are inconspicuous weeds of waste or cultivated ground.

Borreria densiflora DC. *B. spinosa* Cham. & Schlecht. Waste ground of the tierra caliente, apparently not common. Widely distributed in tropical America. Plants stout, erect, less than a meter high, from a taproot, glabrous or nearly so; leaves linear or lance-linear, rough-margined, stiff; flower heads large, subtended by 4–8 large leaves; hypanthium densely pubescent above, the 2 lobes linear; corolla white, slightly exceeding the calyx lobes.

Borreria laevis (Lam.) Griseb. A common weed of waste and cultivated ground, often growing in pastures, usually at 1,300 meters or less; region of San Ramón; Guanacaste. Widely dispersed in tropical America. An annual or perennial, erect or decumbent, usually less than 60 cm. high, the branches glabrous, or puberulent on the angles; leaves ovate or oblong-ovate, 2.5–5 cm. long, acute or acuminate, abruptly decurrent into a slender petiole, more or less pilose, at least on the nerves, or glabrate; flower heads sessile, terminal and axillary, 8–15 mm. in diameter, the terminal ones subtended by large leaves; hypanthium puberulent at the apex; sepals minute, broadly triangular; corolla white, 2–2.5 mm. long; capsule 2 mm. long; seeds transverse-sulcate. One of the most common rubiaceous plants of tropical America.

Borreria latifolia (Aubl.) Schum. *Mielcillo* (Tonduz). Frequent in waste ground or pastures of the tierra caliente, ascending to about 1,000 meters; region of San Ramón. Widely distributed in tropical America. Annual or perennial, prostrate or ascending, conspicuously yellowish when dried, the stout branches 4-angulate, often narrowly winged above, glabrous, or pubescent on the angles; leaves thick, elliptic to oblong, almost sessile, 3.5–7 cm. long, acute or acuminate, acute at the base, more or less scaberulous or puberulent, at least on the nerves; hypanthium glabrous or pilose; flowers densely glomerate in the leaf axils; hypanthium glabrous or pilose; sepals 4, ovate-lanceolate, acute, ciliate, 2 mm. long.

Borreria ocimoides (Burm.) DC. *Chiquizacillo.* Common in waste or cultivated ground, Meseta Central to the coasts, at 1,300 meters or less; often growing in sand along stream beds; Cocos Island. Generally distributed in tropical America. A slender annual, usually much branched, 60 cm. high or less, erect or prostrate, the stems glabrous, or puberulent on the angles; leaves elliptic to linear-lanceolate, 1–3 cm. long, acute, attenuate at the base to a short petiole, or sessile, glabrous, or somewhat scabrous near the margins; flowers densely glomerate in the leaf axils, the heads 5 mm. in diameter; hypanthium glabrous or puberulent; sepals subulate, about equaling the hypanthium; corolla white, shorter than the calyx; capsule 1 mm. in diameter. The flower heads are much smaller than in the other species listed here.

Borreria suaveolens Mey. *B. tenella* Cham. & Schlecht. Frequent in pastures and savannas of the Pacific slope, usually at 1,000 meters or less; Nicoya; also in the region of Cartago. Widely distributed in tropical America. Plants perennial, erect, stout, usually 60 cm. high or less, commonly much branched, densely pubescent or glabrate; leaves linear or lance-linear, the margins often revolute, 2–8 cm. long; flower heads 8–12 mm. in diameter, chiefly terminal and subtended by numerous leaves; sepals 4, linear-subulate, longer than the hypanthium, ciliate; corolla white, 2.5–5 mm. long; capsule oblong, pubescent at the apex; seeds not sulcate. This species, as interpreted by Schumann and the present writer, is a highly variable one, and it and its relatives are in need of careful revision. The Costa Rican material is uniform in its characters, and careful study may show it to represent a species distinct from the South American *B. suaveolens*. There probably are numerous names, now considered synonyms, available for it.

Borreria verticillata (L.) Mey. I have seen only a single Costa Rican specimen apparently referable here, although its condition makes the record uncertain: Between Guachipelín and Volcán de La Vieja, Guanacaste, *Brenes 15539.* Widely distributed in tropical America. Very much like *B. suaveolens* in general appearance, but the sepals only 2; plants usually glabrous or glabrate, the flower heads substantially smaller than in that species.

BOUVARDIA Salisb.

Herbs or shrubs, more or less pubescent; leaves opposite or verticillate; stipules connate with the petioles to form a sheath, this entire, laciniate, or aristate; flowers usually large and rather showy, white, yellow, or red, cymose or cymose-corymbose; calyx 4-lobate, the lobes short or elongate, persistent; corolla tubular or salverform, the 4 lobes short or elongate, valvate; ovary 2-celled, many-ovulate; capsule didymous-globose, loculicidally bivalvate; seeds imbricate, peltate, compressed, winged.—At least one other species has been collected in Central America. About 30 species are found in Mexico, some of them such handsome plants that they have been introduced into cultivation in Europe and elsewhere.

Bouvardia glabra Polak. Linnaea 41: 565. 1877. *Jazmín, Jazmín de la Virgen. B. glabra* var. *gracilis* Polak. op. cit. 566 (thickets and hedges, San José, *Polakowsky 172*). In thickets, San José, *Polakowsky* (photos. of types of species and variety in Herb. Field Mus.). Common in cultivation in gardens of the Meseta Central; collected by the writer at Escazú. Mountains of Guatemala. A shrub of 1.5–3 meters; leaves opposite, short-petiolate, ovate or lance-ovate, 3–7 cm. long, acute to long-acuminate, obtuse or short-acuminate at the base, glabrous, paler beneath; cymes terminal or axillary, mostly 3–5-flowered, the pedicels 2–12 mm. long; hypanthium glabrous; calyx lobes lanceolate or oblanceolate, foliaceous, 4–12 mm. long; corolla white, glabrous, the slender tube 1.5–3.5 cm. long, the lobes oblong or elliptic, 6–11 mm. long; capsule globose, 6 mm. in diameter. It is rather doubtful whether this plant is really native in Costa Rica, for there are no recent collections from plants that were certainly wild. It is quite possible that it did grow in forest areas that have been cleared for cultivation, and that it is now extinct in Costa Rica in a wild state. It is quite possible that the plant was brought to Costa Rica from Guatemala long ago and planted in gardens. The shrub is a rather handsome one, its flowers fragrant.

CALYCOPHYLLUM DC.

Large trees; stipules caducous; flowers small, 4–8-parted, in terminal cymes, the bracts and bractlets large, membranaceous, enclosing the buds; calyx almost obsolete or of short segments, one of the segments in some of the flowers expanded into a large, colored limb; corolla short-funnelform, lobed to the middle or more deeply, the lobes imbricate, the throat villous; stamens long-exserted; capsule elongate, costate, 2-celled, septicidally bivalvate; seeds small, winged. —A single species occurs in Central America.

Calycophyllum candidissimum (Vahl) DC. *Surrá, Salamo, Madroño.* Forests of the Pacific coast, especially in Guanacaste, at low elevations. Southern Mexico to Cuba and Colombia. A tree 20 meters or less, the branchlets reddish brown; stipules triangular or lanceolate, 1 cm. long or less; leaves slender-petiolate, oval to ovate or elliptic, 5–13 cm. long, abruptly acuminate or cuspidate-acuminate, acute or obtuse and abruptly decurrent at the base, glabrous above, paler beneath and usually sparsely hirsute on the costa; hypanthium 2.5–3 mm. long, hirtellous or glabrate; expanded blade of the calyx creamy white, subreniform to ovate-rhombic, 1.5–3 cm. long, rounded at the apex; corolla white, the tube 3 mm. long, the lobes slightly longer; capsule 6–10 mm. long. When in flower, the tree is a conspicuous and handsome one, because of the great abundance of white calyx lobes, which give it the appearance of being covered with white flowers. The bracts retain their original coloring for a long time, but finally turn brown. The wood is pale brown, hard, heavy, strong, highly elastic, fine-textured, usually straight-grained, easy to work, finishes very smoothly. Under the name lancewood it is imported into the United States from Cuba, for archery bows. In Costa Rica and elsewhere in Central America it is utilized for tool handles and many other purposes. In some regions of the Pacific coast fine-toothed combs are made from it.

CEPHAELIS Swartz

Herbs, shrubs, or small trees; stipules free or connate, usually persistent; flowers capitate, the head subtended by an involucre of usually sessile, free or connate, often colored bracts, terminal or axillary; calyx short or elongate, 4–7-dentate, persistent; corolla funnelform or salverform, the tube straight, usually elongate, the throat villous or naked, the 4–5 lobes valvate in bud; ovary 2-celled; fruit drupaceous, containing 2 hard, smooth or costate nutlets, these usually longitudinally sulcate on the inner face.—Other species are known from Central America.

Cephaelis axillaris Swartz. Frequent in forests of the central region, especially south of Cartago; regions of Dota and San Ramón; mostly at 1,000–1,500 meters. Honduras to Colombia and West Indies. A glabrous shrub, 1–1.5 meters high, sparsely branched; stipules bilobate, the lobes obtuse or acute; leaves petiolate, obovate-oblong, abruptly short-acuminate, acute or attenuate at the base; flower heads axillary, sessile, about 1 cm. in diameter or somewhat larger, the small bracts green or purplish; corolla white; fruits blue. Easily recognized among local species by the numerous small, sessile heads.

Cephaelis chlorochlamys Standl., sp. nov.—Frutex, ramulis gracilibus teretibus viridibus, internodiis brevibus vel elongatis; stipulae persistentes virides in vaginam subinflatam 6 mm. longam connatae, vagina in lobos erectos lineari-attenuatos usque 9 mm. longos desinente; folia inter minora graciliter petiolata membranacea, petiolo usque 2 cm. longo glabro; lamina elliptico-oblonga vel lanceolato-oblonga 5–11 cm. longa atque 2–3.5 cm. lata vel major longissime anguste attenuato-acuminata, basi acuta atque subabrupte decurrens, supra viridis glabra, costa gracillima prominente, subtus pallidior, glabra vel tantum ad costam obscure pilosula, costa elevata, nervis lateralibus utroque latere ca. 20 angulo recto abeuntibus subarcuatis, alio vix graciliore inter paria interposito, venulis prominulis laxe reticulatis; capitula terminalia longipedunculata dense multiflora ca. 1.8 cm. longa atque fere aequilata, pedunculo erecto 2.5 cm. longo glabro, bracteis viridibus liberis lanceolatis vel lanceolato-ovatis extus glabris intus sparse pilosulis, acute attenuatis adpressis, interioribus contracto-petiolatis; fructus 5 mm. longus glaber leviter bisulcatus atque costatus, calyce persistente 1 mm. longo acute profunde 5-dentato.—La Hondura de San José, 1,300 meters, August, 1933, *Manuel Valerio 704* (type in Herb. Field Mus.). The single specimen is not in perfect condition for study, and the description may need revision in some details when better material is available.

Cephaelis discolor Polak. Linnaea 41: 572. 1877. *Evea guapilensis* Standl. Journ. Wash. Acad. Sci. 15: 104. 1925 (wet forest near Guápiles, Prov. Limón, 500 meters, *Standley 37025*). *C. guapilensis* Standl. Field Mus. Bot. 4: 295. 1929. In forest, Angostura, *Polakowsky 384* (photo. of type in Herb. Field Mus.). Known only from the localities mentioned. Endemic. Plants simple, suffrutescent, a meter high or less, the stems glabrous; stipules 1 cm. long or more, the lobes linear from a triangular base; leaves slender-petiolate, the blades elliptic-oblong, 14–21 cm. long, 6.5–9.5 cm. wide, abruptly short-acuminate at each end, glabrous above, paler beneath, sparsely hirtellous on the nerves; flower heads terminal, solitary, subsessile, 2–3 cm. in diameter, the bracts purplish green, rounded and apiculate at the apex, covered on both surfaces with slender, multicellular hairs; fruit villous. In combining the two species listed I have had to depend upon photographs of the types and a fragment of *C. discolor*, from the Berlin herbarium. While there is a faint possibility that two species are involved, I believe the reduction of *C. guapilensis* is correct, especially since both types were collected in the same region. Polakowsky describes the plant as "glaberrima," but erroneously, as shown by the type fragment.

Cephaelis elata Swartz. *Cephaelis costaricensis* Schlecht. Linnaea 28: 546. 1856 (type from Costa Rica, the locality not indicated). *Cephaelis phoenicia* Donn. Smith, Enum. Pl. Guat. 5: 39. 1899, nomen. *Uragoga phoenicia* Schum. ex Donn. Smith, loc. cit. in syn. Frequent in forests of the central region, at 1,550 meters or less, also in the tierra caliente; region of San Ramón; Atlantic slope of Guanacaste. Mexico to West Indies and Colombia. A glabrous shrub 1.5–3.5 meters high; leaves short-petiolate, oblong-lanceolate to elliptic-oblong, 10–25 cm. long, acuminate, acute to attenuate at the base; flower heads terminal, long-pedunculate, the 2 outer bracts 2.5–4 cm. long, broadly rounded at the apex, dark red, rarely green; corolla white. The plant is a showy and handsome one. **Cephaelis elata f. lutea** Standl., f. nov. (a forma typica rubrobracteata non nisi bracteis luteis differt) is distinguished by having yellow rather than bright red bracts. It was collected at San Isidro de El General, 750 meters, *H. E. Stork 3084* (type in Herb. Field Mus.).

Cephaelis glomerulata Donn. Smith. Tortuguero, Prov. Limón, *Lankester 1184*. Extending to Guatemala. A glabrous shrub; stipules small, truncate and with minute lobes; leaves short-petiolate, lance-oblong, long-acuminate, acute at the base, lustrous; flower heads terminal, sessile or nearly so, about 2 cm. in diameter, the numerous closely imbricate bracts very broadly rounded at the apex, pearly white, edged with violet-purple.

Cephaelis latistipula Standl. Journ. Wash. Acad. Sci. 18: 281. 1928. Moist forest, Orosi, Prov. Cartago, *Standley 39695*. Collected also at El Muñeco, 1,500 meters. Endemic. Plants simple, suffrutescent, 1 meter high or less, glabrous; stipules distinct, 14–22 mm. long and nearly or quite as wide, conspicuously nerved, short-bilobate at the apex; leaves slender-petiolate, oval-elliptic to broadly elliptic, 14–21 cm. long, 7–9 cm. wide, rounded or very obtuse at the apex and abruptly short-acuminate, narrowed to the acute base; flower heads axillary, dark red, very dense, sessile or nearly so, about 1 cm. long and 2 cm. broad, the outer bracts broadly oblong, obtuse; corolla 5 mm. long.

Cephaelis Pittieri Krause, Bot. Jahrb. 54: Beibl. 119: 45. 1916. Cañas Gordas, 1,100 meters, *Pittier 11162* (photo. of type in Herb. Field Mus.). Collected also at San Isidro del General, 750 meters, in deep forest. A shrub or small tree, the branches glabrous; stipules united into a tube 2–2.5 mm. long, this bearing narrow setae 5–6 mm. long; leaves slender-petiolate, oblong-lanceolate, 14–20 cm. long, 3–4.5 cm. wide, narrowly long-acuminate, attenuate at the base, thin, glabrous or with a few appressed hairs beneath on the nerves; flower heads terminal, short-pedunculate, somewhat 3-lobate, densely many-flowered, about 2 cm. long and 2.5–4 cm. wide, the bracts red, the outer ones ovate, acuminate, sparsely pilose.

Cephaelis tomentosa (Aubl.) Vahl. Forests of the tierra caliente, at 900 meters or less, common in many localities. Mexico to Bolivia and Brazil. A slender shrub of 1–3 meters, sparsely branched, hirsute or at least pilose on almost all parts; leaves thin, lanceolate to ovate-elliptic, large, long-acuminate, acute to attenuate at the base; flower heads large, terminal, pedunculate, the bright red, acute or short-acuminate bracts much exceeding the flowers; corolla yellow; fruit blue. The shrub is an exceptionally showy and rather handsome one. It has a wide range in tropical America, and in most herbaria is represented by more specimens than perhaps any other tropical American member of the family.

Cephaelis Tonduzii Krause, Bot. Jahrb. 54: Beibl. 119: 45. 1916. Tuis, 650 meters, *Tonduz 11461* (photo of type in Herb. Field Mus.). Stems simple, suffrutescent, 15–30 cm. high, glabrous; stipule tube short, with linear lobes; leaves long-petiolate, lanceolate or oblong-lanceolate, 14–20 cm. long, 6–7.5 cm. wide, long-acuminate, narrowed to the base, glabrous; flower heads terminal, subglobose, 2.2–3 cm. broad, the peduncle 2–3 cm. long, the bracts red, broadly ovate, short-acuminate, sparsely short-pilose. This is probably synonymous with *C. discolor*.

CHIMARRHIS Jacq.

Trees; stipules caducous; leaves short-petiolate; flowers small, in axillary, long-pedunculate, corymbose cymes; hypanthium campanulate, the 5 calyx lobes very short, persistent; corolla short-funnelform, the tube villous in the throat, the 5 lobes valvate; stamens exserted; ovary 2-celled, many-ovulate; fruit capsular, small, bisulcate, septicidally bivalvate from the apex; seeds angulate-globose.—Two other Central American species are found in Panama.

Chimarrhis parviflora Standl. Trop. Woods 11: 26. 1927. *Manwood. Yema de huevo* (Panama). Changuinola Valley, Atlantic coast, *Cooper & Slater 120*. Collected at various localities in the lowlands of Panama, and doubtless extending into Costa Rica. A tree of 18 meters, the trunk 25 cm. in diameter, with low buttresses; branches minutely puberulent or sericeous; stipules linear-lanceolate, 1.5–2.5 cm. long; leaves oblong-obovate, 8–15 cm. long, 2.5–6 cm. wide, acute or abruptly acute, acute to abruptly attenuate at the base, glabrous above, densely sericeous beneath when young but in age glabrate; cymes 2–7 cm. broad, very dense and many-flowered, pedunculate, the branches densely puberulent; calyx and hypanthium together 1 mm. long; corolla 2 mm. long, glabrous outside.

CHIOCOCCA P. Br.

Shrubs or small trees, often scandent or sarmentose, usually glabrous; leaves petiolate, membranaceous to coriaceous; stipules broad, usually cuspidate, persistent; flowers small, whitish, pedicellate, in axillary, simple or paniculate, often secund racemes; hypanthium compressed, the calyx 5-lobate, persistent; corolla funnelform, glabrous in the throat, the 5 lobes spreading or reflexed, valvate; ovary 2-celled, the cells 1-ovulate; fruit small, drupaceous, white at maturity, usually orbicular and strongly compressed.—No other species are known from Central America.

Chiococca alba (L.) Hitchc. *C. racemosa* L. Frequent in thickets and forest, Meseta Central to the coasts, at 1,300 meters or less. Generally distributed in tropical America. A shrub, the branches usually recurved or trailing, often scandent; stipules 1–2 mm. long; leaves short-petiolate, very variable in form, usually ovate or oval-ovate, sometimes lanceolate, mostly 3–6 cm. long, acute or short-acuminate, rounded and short-decurrent at the base, glabrous; racemes few–many-flowered, the flowers short-pedicellate; corolla white or yellowish, 6–8 mm. long, the short lobes triangular;

stamens included; fruit white, juicy, strongly compressed, 4–8 mm. in diameter. Called Lágrimas de María and Lágrimas de San Pedro in other parts of Central America.

Chiococca phaenostemon Schlecht. *Chiraquilla.* Frequent in forests of the central region; El General; regions of San Ramón and Dota; at 750–2,000 meters. Mexico to Panama. A shrub or tree, sometimes 14 meters high, glabrous or nearly so, reported to be sometimes a large vine; leaves slender-petiolate, 5–12 cm. long, coriaceous; corolla white or yellowish, 5–8 mm. long; filaments and anthers conspicuously exserted. The trunk is sometimes 60 cm. in diameter at the base; bark thin, light to medium brown, nearly smooth; flowers fragrant.

CHOMELIA Jacq.

Shrubs or small trees, usually armed with stout, axillary spines, the leaves petiolate; stipules acuminate, deciduous; flowers small, white, in pedunculate, axillary cymes; calyx 4-lobate, the lobes narrow, equal or unequal, persistent; corolla salverform, with a slender, elongate tube, the 4 lobes elongate, valvate or with subimbricate margins; ovary 2-celled, the cells 1-ovulate; fruit small, drupaceous, the stone oblong, 2-celled, osseous.—A single species is known from North America.

Chomelia spinosa Jacq. *Malacahuite. Guettarda costaricensis* Schum. ex Tonduz, Bull. Herb. Boiss. 3: 7. 1895, nomen. Frequent in thickets of the Pacific tierra caliente. Southern Mexico to northern Brazil. A shrub or tree, sometimes 9 meters high, the branches reddish brown; stipules 4–8 mm. long; leaves often crowded on short, lateral branches, ovate-orbicular to oval or elliptic, 4–8 cm. long, abruptly short-acuminate, rounded to acute at the base, sparsely pilose above, pilose beneath, especially on the nerves, with appressed or spreading hairs; cymes few-flowered, slender-pedunculate, the flowers sessile or nearly so; calyx and hypanthium 2–3 mm. long, the calyx lobes lanceolate or triangular-subulate, half as long as the hypanthium or shorter; corolla yellowish white, sericeous outside, the tube 12–22 mm. long, the lobes 4–6 mm. long, each with a slender, hornlike appendage at or just below the apex; fruit black and juicy at maturity, 9–12 mm. long, sparsely strigillose. It is stated that the fruits are edible, and are employed for preparing *refrescos.* It is reported also that squirrels and pisotes eat the fruits and grow fat upon them at the principal fruiting season, in November. The fruits are said to be used as a remedy for fevers. The flowers are fragrant.

CINCHONA L.

Trees or shrubs, glabrous or variously pubescent; stipules large, distinct, caducous; leaves large or small, petiolate; inflorescence terminal, paniculate, with opposite branches, usually many-flowered, the flowers 5-parted; calyx campanulate, dentate or lobate; corolla salverform, pubescent outside, the spreading lobes valvate in bud, more or less villous within on the margins; stamens semi-exserted or included, the anthers linear; capsule ovoid or oblong to subcylindric, bisulcate, dehiscent from the base to the apex; seeds numerous, broadly winged.—A single species is native in North America, the others inhabiting the South American Andes. The genus contains some of the most important drug plants of the earth, source of quinine, the universal remedy for malaria.

Cinchona pubescens Vahl. Forests of the region of San Ramón, at about 1,100 meters; Tiquires, 1,700 meters. Extending to Bolivia. A medium-sized tree, the branchlets pubescent; stipules ovate, obtuse or acute, sericeous or almost glabrous; leaves slender-petiolate, large, the blades broadly ovate to orbicular, rounded to acute at the apex, cordate to acute at the base and often decurrent, usually glabrate above, beneath densely short-pilose or tomentose to glabrate; panicles large, often leafy, many-flowered, the flowers subsessile; hypanthium densely sericeous; calyx teeth short and broad, acute; corolla red or pink, sericeous, 10–12 mm. long, the lobes half as long as the tube; capsule lanceolate or oblong, glabrate, usually 1.5–2.5 cm. long. One of the forms of this species, cultivated in the East Indies, is probably the principal source of quinine. No information is available as to Costa Rican vernacular names, if any, or regarding any local knowledge of the tree's properties. In North America the species is known only from Costa Rica, and there, apparently, it has been collected only in recent years.

COCCOCYPSELUM Swartz

Prostrate, annual or perennial herbs, usually pubescent; leaves petiolate, small; stipules small, solitary; flowers small, purplish or blue, capitate, the heads axillary, solitary, sessile or pedunculate, few–many-flowered; calyx 4-lobate, the lobes narrow, persistent; corolla funnelform, the throat glabrous, the limb 4-lobate, the lobes oblong, valvate; ovary 2-celled, many-ovulate; fruit baccate, ovoid, juicy, blue; seeds small, subangulate, granulate.—A few other species have been found in Central America.

Coccocypselum guianense (Aubl.) Schum. Occasional in forests of the central region, chiefly at 1,400–1,800 meters. Southern Mexico to West Indies and Brazil. Stems densely pilose with long, spreading, soft hairs; leaves oval to ovate or rounded-ovate, 2.5–7 cm. long, rounded to subacute at the apex, truncate to obtuse at the base, densely pilose on the upper surface with long and short, mostly appressed hairs, often purplish beneath, densely soft-pilose; heads pedunculate, mostly 2–4-flowered; calyx lobes 3–4 mm. long; corolla blue, 7–10 mm. long; fruit pilose, prussian blue, 6–11 mm. in diameter.

Coccocypselum hirsutum Bartl. Frequent in forests of the central region, chiefly at 750–1,800 meters; region of San Ramón; Buenos Aires. Mexico to Bolivia. Branches densely hirsute or hispid; leaves oval to oblong-ovate, rounded to subacute at the apex, rounded at the base, hirsute or hispid above with long, spreading hairs, hirsute beneath; heads 3–5-flowered, pedunculate; calyx lobes 2.5–5 mm. long; corolla hirsute, 12–14 mm. long; fruit violet-blue, 6–10 mm. in diameter.

Coccocypselum hispidulum Standl. *Tontanea hispidula* Standl. In forest, Pejivalle, 900 meters; doubtless also in other localities. Panama. Branches slender, pilose with stiff, whitish, appressed or ascending hairs; leaves broadly ovate or oblong-ovate, 2–3.5 cm. long, acutish to rounded at the apex, rounded and short-decurrent at the base, hispid above, sparsely or densely hispid beneath; flower heads mostly sessile, sometimes very shortly pedunculate, few-flowered; calyx lobes 2–4 mm. long; corolla bluish white, 7–9 mm. long; fruit prussian blue, 8–15 mm. long.

Coccocypselum lanceolatum (Ruiz & Pavón) Pers. *C. canescens* Willd.; *Tontanea canescens* Standl. Occasional in forests of the central region; region of San Ramón; mostly at 1,000–1,400 meters. Southern Mexico to Peru and Brazil. Branches densely pilose-sericeous when young; leaves oblong to ovate, 2–8 cm. long, acute or obtuse, obtuse to subcordate at the base, densely pilose above with short, mostly appressed, yellowish hairs, densely pilose beneath with longer, appressed or somewhat spreading hairs; heads densely many-flowered, the peduncles 1–6 cm. long; calyx lobes oblong or ovate, 2–3 mm. long; corolla purple-blue, 5 mm. long; fruit bright blue, densely pilose, 5–7 mm. in diameter. This species is frequent in the more open oak forests about Santa María de Dota. The brightly colored berries are handsome and rather showy.

Coccocypselum pleuropodum (Donn. Smith) Standl. El Muñeco; region of San Ramón; 1,000–1,400 meters, in forest. Extending to southern Mexico and Cuba. Stems slender, hirsute with long, spreading hairs; leaves reniform or orbicular, 1–3.5 cm. long, broadly rounded at the apex, cordate or truncate at the base, hirsute or hispid above with spreading hairs, often purplish beneath, sparsely or densely long-hirsute; heads pedunculate, mostly 2–4-flowered; calyx lobes 2–4 mm. long; corolla about 12 mm. long, bright blue; fruit densely hirsute.

COFFEA L. Coffee

Shrubs or small trees, usually glabrous throughout; stipules triangular, persistent; leaves short-petiolate; flowers sessile in the leaf axils, 4–7-parted; calyx very short; corolla salverform or funnelform, the lobes dextrorsely contorted in bud; anthers subsessile, dorsifixed; fruit fleshy, indehiscent, 2-seeded; seeds semi-oval, flat and deeply furrowed on the inner face.—No species of the genus are native in America.

Coffea arabica L. *Café.* Native of Abyssinia, but now cultivated generally in most tropical regions of suitable climate. It is said to have been introduced into Costa Rica by Governor Acosta about 1808, and soon became of great importance in local agriculture, being now the most important agricultural product of the country, at least for export. In Costa Rica coffee is grown principally in the central region, but also in the mountains of Guanacaste and in other remote areas, chiefly at elevations of 800–1,400 meters. It is planted upon a small scale also at lower elevations, and thrives if there is not too abundant moisture. The coffee of Costa Rica is of superior quality, and holds an enviable reputation in the markets of the world. Wild coffee plants are sometimes found in the forest in remote regions, to which the seeds have been carried probably by birds.

Coffea liberica Hiern. *Café de Liberia.* Liberian coffee, native of West Africa, is planted occasionally for experimental purposes, or as a curiosity. It is grown extensively for market in some parts of the earth. In this species the corolla has 6 or 7 lobes; the somewhat smaller corolla of *C. arabica* has only 5 lobes. The fruits of *C. liberica* are larger than those of *C. arabica.*

COSMIBUENA Ruiz & Pavón

Glabrous shrubs or small trees, usually epiphytic; leaves petiolate, rather thick and somewhat fleshy; stipules deciduous; flowers large, terminal, solitary or cymose, pedicellate; hypanthium oblong or turbinate, the calyx tubular or campanulate, entire or 5–6-dentate, deciduous; corolla salverform or funnelform, the tube elongate, the limb 5–6-lobate, the lobes spreading, contorted; anthers included; ovary 2-celled, the ovules numerous; capsule narrowly oblong or cylindric, coriaceous, 2-celled, septicidally bivalvate from the apex; seeds numerous, oblong, produced at each end into a bifid wing.—Two other species are known from Central America, in Nicaragua and Panama.

Cosmibuena ovalis Standl. Region of El General. Panama. An epiphytic shrub or small tree, or sometimes terrestrial and 9 meters high, glabrous throughout; stipules obovate-oval, 1.5–2 cm. long, rounded at the apex; leaves on stout petioles, the blades oval to broadly obovate, 6–14 cm. long, rounded or obtuse at the apex, acute or attenuate at the base; cymes 3–5-flowered, the stout pedicels 1–2 cm. long; calyx 11 mm. long, shallowly 5-dentate, the teeth deltoid, acute; corolla white or tinged outside with pink, the tube 6–7 cm. long, 3.5–5 mm. thick, the oblong lobes 2.5–3 cm. long, rounded at the apex; capsule oblong, 4.5 cm. long, 10–12 mm. thick. A specimen of *Hoffmann 717* from Costa Rica, without specific locality, was indicated in the Berlin herbarium as a new species, still unpublished, by Schumann.

COUSSAREA Aubl.

Shrubs or trees, usually glabrous; stipules commonly ovate-triangular, muticous, apiculate, or truncate, never subulate-aristate nor connate into a long, intrapetiolar sheath; leaves mostly opposite, short-petiolate or subsessile, commonly more or less coriaceous; inflorescence terminal; calyx cupular and truncate, sometimes 4-dentate or rarely 4-lobate; corolla funnelform or salverform, the throat naked, the 4 lobes valvate in bud; anthers subsessile in the corolla tube; ovary 2-celled, the cells 1-ovulate; fruit baccate, by abortion commonly 1-seeded, longer than broad, the seed vertical.—Two or three other species occur in Central America.

Coussarea Austin-Smithii Standl., sp. nov.—Frutex vel arbuscula 4–5-metralis, trunco usque 10 cm. diam., ramulis sulcatis striatisque, novellis dense minute puberulis, internodiis brevibus vel elongatis; stipulae persistentes 6–7 mm. longae e basi rotundato-ovata abrupte breviter acuminatae, apice brevissime bilobae; folia mediocria breviter petiolata crasse membranacea, petiolo crassiusculo 8–15 mm. longo puberulo; lamina lanceolato-oblonga usque late

elliptica vel oblongo-obovata 6.5–14 cm. longa 3–6.5 cm. lata acuta vel subobtusa, saepe breviter abrupte acuminata, basi acuta usque subrotundata, supra in sicco fusca, ad costam dense minute puberula, subtus pallidior, ad nervos venasque dense minute pilosula, costa gracili elevata, nervis lateralibus utroque latere ca. 11 obliquis angulo lato adscendentibus arcuatis, venulis prominulis laxe reticulatis; inflorescentia corymbiformis vel thyrsoidea laxe vel dense pauci- vel multiflora, vulgo 4–6 cm. longa atque aequilata vel latior, 3–4.5 cm. longe pedunculata, ramis primariis subfastigiatis erectis vel adscendentibus minute puberulis, floribus sessilibus vel subsessilibus; hypanthium ca. 1.5 mm. longum crassum minutissime puberulum, calyce aequilongo breviter inaequaliter dentato, dentibus late triangularibus obtusis vel acutiusculis; corolla alba extus sat dense minutissime pulverulenta, tubo 9 mm. longo superne paullo dilatato, lobis patentibus linearibus attenuatis aequilongis vel paullo longioribus; fructus late obovoideus ca. 1 cm. longus.—Zarcero, 1,590 meters, July, 1937, *Austin Smith 4226* (type in Herb. Field Mus.); also *A230, H226.* Forests of La Palma de San Ramón, 1,275 meters, August, 1925, *Brenes 4400;* in 1925 and 1928, *Brenes 4411, 5949.* San Antonio de San Ramón, July, 1927, *Brenes 5641.* Tapesco de Zarcero, 2,000 meters, *Austin Smith H427.* Probably a good many other collections from the central mountains, determined in herbaria as *C. paniculata* (Vahl) Standl., are referable to this species. *C. paniculata* is native in Trinidad, and apparently is not found in Central America.

Coussarea impetiolaris Donn. Smith, Bot. Gaz. 37: 418. 1904. La Colombiana, Llanuras de Santa Clara, 200 meters, *Pittier 7582* (*13408*). Panama to British Honduras. A small tree; stipules 4 mm. long, rounded, mucronulate; leaves subsessile, obovate-elliptic or obovate-oblong, 13–16 cm. long, 5–6.5 cm. wide, cuspidate-acuminate, cuneate to the base, the base itself narrowly rounded or obtuse, glabrous; inflorescence thyrsoid-paniculate, short-pedunculate, rather dense, minutely puberulent or pilosulous, the flowers congested; calyx and hypanthium puberulent or pilosulous, the calyx undulate, about 2 mm. long; corolla white, pilosulous or tomentulose, about 2.5 cm. long or sometimes shorter, the tube almost twice as long as the lobes; fruit about 2 cm. long.

Coussarea latifolia Standl. Journ. Wash. Acad. Sci. 18: 281. 1928. Forests of Tsaki, Talamanca, 200 meters, *Tonduz 9574.* Known only from the original collection. A tree, glabrous through-

out; stipules semiorbicular, 5 mm. long, broadly rounded at the apex; petioles 2–2.5 cm. long; blades broadly elliptic or ovate-elliptic, 17–25 cm. long, 9–16 cm. wide, rounded and apiculate at the apex, acute or obtuse at the base, the lateral nerves about 9 on each side; inflorescence cymose-racemose, 6 cm. long, pedunculate, the cymules 2–3-flowered, the pedicels 1–4 mm. long; calyx tubular-campanulate, 5–7 mm. long, truncate; corolla yellowish white, the tube (in bud) 1 cm. long, the lobes 13–15 mm. long. Easily recognized among Costa Rican species by the very large leaves and calyx.

Coussarea talamancana Standl., sp. nov.—Ramuli crassiusculi virides sparse minute puberuli, internodiis brevibus; stipulae deciduae, perfectae non visae; folia magna coriaceo-membranacea, breviter petiolata, petiolo 7–10 mm. longo crassiusculo glabro vel inconspicue puberulo; lamina late obovato-elliptica 15–20 cm. longa 9–10 cm. lata, apice acuta et sensim lineari-caudata, acumine ipso fere lineari usque 2.5 cm. longo, basi acuta, glabra, supra fusco-viridis, costa nervisque prominulis, subtus pallidior, costa pallida elevata, nervis lateralibus utroque latere ca. 11 prominentibus angulo fere recto divergentibus arcuatis, venulis prominulis laxe reticulatis; inflorescentia parva sessilis thyrsoideo-paniculata (bene evoluta non visa) dense multiflora, ramis minutissime puberulis, floribus breviter pedicellatis; hypanthium pallidum sparse minute puberulum, calyce truncato fere 2 mm. longo; corolla in alabastro 7–8 mm. longa extus minute puberula apicem versus angustata, lobis tubo paullo longioribus.—Talamanca Valley, June, 1927, *G. P. Cooper T4* (type in Herb. Field Mus.). Easily recognizable among Central American species by the very long and narrow acuminations of the leaves.

COUTAREA Aubl.

Shrubs or small trees; leaves petiolate, membranaceous; stipules short, acute; flowers large, terminal or axillary, solitary or cymose, pedicellate; hypanthium obovoid-turbinate; calyx 5–8-lobate, deciduous; corolla funnelform-campanulate, more or less oblique, the tube often curved and gibbous-ventricose, the throat glabrous, the limb 5–8-lobate, the lobes short, plicate-imbricate or contorted; anthers exserted; ovary 2-celled, many-ovulate; capsule oval or obovoid, more or less obcompressed, coriaceous or ligneous, loculicidally bivalvate; seeds imbricate, broadly winged.—One other species is known from northern Central America.

Coutarea hexandra (Jacq.) Schum. Thickets of the Pacific tierra caliente. Southern Mexico to Argentina. A shrub or small tree, 5 meters high or less, the branches conspicuously lenticellate, usually glabrous; stipules 2–4 mm. long; leaves short-petiolate, ovate to elliptic or oval, 5–12 cm. long, acute or cuspidate-acuminate, rounded to acute at the base, glabrous or nearly so, or sometimes rather densely short-pilose beneath; flowers mostly in 3-flowered, terminal and axillary cymes; calyx lobes 6, lance-subulate, 5–12 mm. long; corolla white or yellowish, often tinged with purple, 6–7.5 cm. long, the short lobes acute or obtuse; capsule 2.5–3.5 cm. long, 2 cm. wide, dark brown. Called Quina in Salvador, where the bitter bark is employed as a substitute for quinine in the treatment of fevers.

CRUSEA Cham. & Schlecht.

Annual or perennial herbs, usually low, the stems more or less tetragonous; leaves small, ovate or lanceolate, conspicuously nerved; stipules connate with the petioles to form a ciliate sheath; flowers small or medium-sized, usually pink, in dense heads surrounded by 4 foliaceous bracts; hypanthium compressed; calyx lobes 4, elongate-subulate, alternating with minute teeth, persistent; corolla funnelform, the slender tube glabrous in the throat, the lobes 4, spreading, valvate; anthers exserted; ovary 2-celled, the cells 1-ovulate; fruit capsular, didymous, 2-coccous, the cocci indehiscent, separating from the persistent axis.—Most species of the genus are Mexican, but one or two others occur in northern Central America.

Crusea brachyphylla Cham. & Schlecht. In potrero, Laguna de La Chonta, northeast of Santa María de Dota, 2,000 meters, *Standley 42231*. Ranging to Mexico. Plants annual, erect, 30 cm. high or less, the stems hispidulous, densely leafy; leaves oblong to oblong-ovate, 1–3 cm. long, obtuse or acute, usually abundantly hispidulous on both surfaces; corolla tube very slender, about 8 mm. long, minutely scaberulous or almost glabrous. The plant was plentiful in the Costa Rican locality, where it is perhaps introduced.

Crusea coccinea DC. Brushy slope, above Los Lotes, north of El Copey, 2,100–2,400 meters, *Standley 42572*. Panama to Mexico. An ascending herb, the stems sometimes a meter long, glabrous; leaves petiolate, ovate or lance-ovate, 3–5 cm. long, long-acuminate, acuminate at the base, almost glabrous above, scabrous beneath on the nerves; corolla pale red, about 3 cm. long.

Crusea parviflora Hook. & Arn. Dry forest or thickets, tierra caliente of Guanacaste. Extending to Mexico. Plants erect and often much branched, less than a meter high, the branches pale, pilose with short, soft, white hairs; leaves lanceolate, mostly 2–4 cm. long, acute to long-acuminate, rather densely hispidulous on both surfaces; flower heads about 1 cm. in diameter, very dense and many-flowered; corolla white, scarcely over 3 mm. long.

DECLIEUXIA HBK.

Perennial herbs or low shrubs, usually fuscous when dried; stipules subulate-linear or obsolete, often decurrent; leaves opposite or verticillate, usually small and sessile, commonly coriaceous; flowers small, cymose, 4-parted; sepals free or nearly so and often remote; corolla funnelform, the lobes valvate; fruit didymous, indehiscent, 2-celled, the cells 1-seeded, laterally compressed.—A single species is known from North America.

Declieuxia fruticosa (Willd.) Kuntze, var. **mexicana** (DC.) Standl. *D. mexicana* DC. In grassy places, often in savannas, Pacific tierra caliente. Panama to Mexico, the typical form of the species occurring in northern South America. Plants herbaceous, usually with several simple or branched stems, 30 cm. high or less, glabrous throughout or nearly so; leaves subsessile, narrowly lance-oblong or linear-oblong, mostly 2–3 cm. long, acute or subobtuse, narrowed to the subacute base; cymes small and few-flowered, pedunculate, with small, persistent, linear bracts; corolla white, 5–6 mm. long; fruit lustrous. The plant of Central America and Mexico differs so little, if at all, from that of Colombia and Venezuela that it scarcely deserves varietal designation.

DEPPEA Schlecht. & Cham.

Shrubs, more or less pubescent; leaves opposite, membranaceous; stipules small, deciduous; flowers small, bright yellow, in axillary or terminal cymes or umbels, pedicellate; hypanthium turbinate or hemispheric, the calyx 4-lobate, the lobes persistent; corolla rotate or short-funnelform, the throat glabrous, the 4 lobes spreading, contorted; anthers exserted; ovary 2-celled, the ovules numerous; capsule small, turbinate or obovoid, costate, loculicidal from the apex, the valves cleft; seeds numerous, subglobose, minute, granulate.—At least one other species is found in northern Central America.

Deppea grandiflora Schlecht. *D. costaricensis* Polak. Linnaea 41: 566. 1877 (Desengaño, *Polakowsky 148;* photo. of type in Herb. Field Mus.). In forest, regions of Dota and Desengaño, chiefly at 1,500–1,800 meters. Panama to southern Mexico. A slender shrub, 1.5–3 meters high, the branches densely puberulent when young;

stipules minute, deltoid; leaves slender-petiolate, oblanceolate to oblong-elliptic, 5–15 cm. long, 1.5–6.5 cm. wide, acuminate or attenuate at each end, thin, glabrous or sparsely puberulent above, puberulent or villosulous beneath, especially on the nerves; inflorescence cymose-corymbose, usually many-flowered, long-pedunculate, the pedicels 1–6 mm. long; calyx lobes deltoid, acute, minute; corolla glabrous, 6–8 mm. long, the lobes obtuse; capsule 3–5 mm. long, glabrous, 8-costate, obtuse or acute at the base.

DIDYMAEA Hook. f.

Slender, fragile, flaccid herbs, the branches tetragonous; leaves small, opposite, petiolate; stipules geminate, subulate, persistent, finally recurved; flowers minute, axillary, pedicellate, the pedicels not articulate with the calyx, in fruit elongate, spreading or recurved; calyx entire; corolla glabrous, campanulate or rotate, 4-lobate, the lobes triangular, valvate; ovary 2-celled, the cells 1-ovulate; fruit didymous, lustrous, the lobes globose, fleshy, one of them often abortive.—The genus consists of two species, the other Mexican.

Didymaea alsinoides (Schlecht. & Cham.) Standl., comb nov. *Nertera alsinoides* Schlecht. & Cham. Linnaea 6: 413. 1831. *D. mexicana* Hook. f. Growing in forest, 1,500–2,400 meters; collected on the slopes of Barba and in the region of Dota. Ranging to Mexico. Plants procumbent or often scandent, the stems a meter long or less, glabrous or hispidulous; leaves mostly 1.5–3 cm. long, lanceolate or lance-oblong, sometimes ovate, acute to long-acuminate, glabrous or hispidulous above, usually glabrous beneath except on the nerves, there hispidulous; fruits very lustrous, dull, dark blue, the lobes about 6 mm. long. From Costa Rica I have seen only three collections that seem referable to the presumably typical form of the species. There is some question even about these, and I have a suspicion that when a larger amount of material has been assembled from Costa Rica and Panama, it may be possible to separate varietally or perhaps even specifically all the southern collections of *Didymaea*.

It is rather strange that the name *Nertera alsinoides* should have been overlooked so long, but it is not listed in the *Biologia Centrali-Americana*. In the *Index Kewensis* it is reduced to synonymy under *Nertera depressa*. The species was referred with doubt to *Nertera* by Schlechtendal and Chamisso. While I have seen no authentic material of *Nertera alsinoides*, the rather brief description seems to apply without any doubt to *Didymaea*, and I do not hesitate to make the transfer.

Didymaea alsinoides var. **australis** Standl., var. nov.—A forma typica speciei ut videtur non nisi foliis brevioribus atque latioribus differt; lamina late ovata usque rotundato-ovata, interdum suborbicularis, plerumque 1–1.8 cm. longa, 8–12 mm. lata, apice acuta vel abrupte acutata, basi late rotundata vel subtruncata atque subito breviter decurrens, supra breviter hispidula vel glabrata, subtus glabra vel ad nervos hispidula; fructus glaber.—La Carpintera, 1,700 meters, November, 1908, *Alfred & A. C. Brade 2143* (type in Herb. Field Mus.). El Copey, 2,250 meters, *Stork 1540*. Oak forest near Quebradillas, north of Santa María de Dota, 1,800 meters, *Standley 43027*. Viento Fresco, Prov. Alajuela, 1,600–1,900 meters, *Standley & Torres 47862*. Hacienda Montecristo, 1,520 meters, *Solís 462*. El Gallito de Heredia, *Brenes 21706*.—PANAMA: Cerro Punta, Prov. Chiriquí, 1,500–2,000 meters, *Seibert 255*. Bajo Chorro, Prov. Chiriquí, 1,800 meters, *M.E. Davidson 395*. Inspection of the numerous collections of *Didymaea* from Costa Rica and Panama shows that most of them can be associated at a glance, and distinguished from the normal Mexican form by their relatively much broader and shorter leaf blades. It may be that this plant is a distinct species, but I find no satisfactory characters to justify specific rank, and the few specimens that approach the Mexican form seem to indicate that the form here described deserves no more than varietal status.

Didymaea alsinoides var. **mollis** Standl., var. nov.—Caules elongati dense pilosulo-tomentulosi; folia breviter petiolata, lamina oblongo-ovata vulgo 2–3 cm. longa, acuta vel subacuminata, basi late rotundata vel truncata, utrinque dense molliter pallido-pilosula; fructus dense pilis brevibus incurvis pilosulus.—Cerro de Las Vueltas, wet forest, an ascending or subscandent herb, the fruit dark blue, common, *Standley & Valerio 43949* (type in U. S. Nat. Herb.). This form is a very distinct one, because of the dense, short, soft pubescence that covers all parts, including the fruit (the fruit is glabrous in all other specimens of the genus examined). With more material this may well prove to be a distinct species.

DIODIA L.

Annual or perennial herbs, sometimes low shrubs; stipules united with the petioles to form a setiferous sheath; leaves opposite, usually small and narrow; flowers small or minute, axillary and glomerate or spicate or cymose; sepals 2 or 4, equal or unequal; corolla funnelform, 4-lobate, the lobes valvate; fruit of 2 carpels, these indehiscent, membranaceous or ligneous, usually separating from the persistent column.

—A few other species are found in Central America, and some of them are to be expected in Costa Rica.

Diodia brasiliensis Spreng. var. **angulata** (Benth.) Standl. *Triodon angulatum* Benth. Region of San Ramón, 1,000–1,200 meters, in pastures or forest, usually along or near streams. Extending to Mexico; typical form of the species in Brazil and southward. A slender shrub, 1 meter high or less, often densely branched, glabrous or sparsely puberulent; leaves oblong to elliptic, 5–20 mm. long, often appearing verticillate, obtuse or acute, short-petiolate; flowers very small, white, densely clustered in the axils of the upper leaves: calyx 4-dentate; corolla 2 mm. long.

Diodia teres Walt. Nicoya. Widely distributed in tropical and temperate America; in Central America usually growing in grassland. An erect annual, simple or branched, usually 30 cm. high or less, hirsute or pilose; leaves linear or lance-linear, 1.5–4.5 cm. long, thick-margined; flowers axillary, solitary or geminate, sessile or nearly so; corolla 3–4 mm. long, white or pink; fruit 3 mm. long, usually hispidulous.

DUROIA L. f.

Shrubs or trees; leaves opposite or verticillate, sessile or petiolate; stipules oblong, deciduous; flowers often large, white or yellowish, dioecious, in terminal fascicles or cymes, the pistillate flowers rarely solitary; hypanthium oblong to hemispheric, the calyx cupular or tubular, persistent, truncate or 6–9-lobate; corolla salverform, sericeous outside, the throat pilose or naked, the limb 6–9-lobate, the lobes oblong, contorted; anthers included; ovary 2–4-celled, many-ovulate; fruit baccate, globose to oblong, 1–4-celled; seeds large, horizontal, compressed, embedded in pulp.—No other species are known from North America.

Duroia costaricensis Standl. Contr. U. S. Nat. Herb. 20: 208. 1919. Sierpe, Pacific coast, *Pittier 6803*. Known only from the original collection. Branches hirsute; leaves opposite, short-petiolate, oblong-obovate, 10–17 cm. long, 3.5–6.5 cm. wide, obtuse and cuspidate-acuminate, cuneately narrowed to the base, abundantly hirsute; staminate flowers fasciculate-cymose, short-pedicellate; calyx and hypanthium densely hirsute, the calyx 4–4.5 mm. long, the 6–7 lobes linear-subulate, equaling the tube; corolla in bud 14 mm. long, densely sericeous outside, the lobes longer than the tube.

ELAEAGIA Wedd.

Trees or shrubs, usually pubescent; stipules free, or connate at the base; leaves petiolate, usually large; flowers small, in terminal racemes or panicles; hypanthium small, hemispheric, sulcate; calyx 5-lobate, persistent; corolla short-funnelform, the throat villous, the limb 5-lobate, the lobes oblong, recurved, contorted in bud; ovary 2-celled, many-ovulate; capsule small, 2-celled, loculicidally bivalvate, the valves finally bifid; seeds minute, elongate.—No other species are known from Central America.

Elaeagia auriculata Hemsl. Diag. Pl. Nov. 32. 1879. At 1,350 meters, without definite locality, *Endres 95.* Mountains south of Cartago; region of San Ramón; at 1,100–1,500 meters. Honduras. A shrub or tree of 3–8 meters, with few branches, the branchlets tetragonous, densely tomentulose; stipules very large, at least 5 cm. long; leaves sessile or nearly so, ovate-elliptic to rounded-elliptic-obovate, as much as 40 cm. long and 23 cm. wide but often smaller, acute or abruptly short-acuminate, narrowed to the auricled base, densely and softly short-pilose, especially beneath; flowers white, in large, broad, sessile panicles; calyx and hypanthium puberulent, together scarcely more than 2 mm. long; corolla 3–4 mm. long, glabrous outside, lobed almost to the base; capsule subglobose, 3 mm. in diameter.

Elaeagia Karstenii Standl. Tapantí, 1,300 meters, *M. Valerio 1665.* Venezuela and Colombia. A tree, the branchlets hirtellous or glabrate; stipules caducous, about 3 cm. long, obtuse or rounded at the apex; leaves short-petiolate, the blades broadly elliptic or obovate-elliptic, 13–25 cm. long, short-acuminate, acute at the base, puberulent, pilosulous, or glabrate; inflorescence broadly paniculate; calyx glabrous, 1.2 mm. long, shallowly 5-lobate; corolla 3–3.5 mm. long; capsule globose, 2 mm. long. The single Costa Rican specimen is an incomplete one, almost surely referable to this genus. It represents a species evidently different from *E. auriculata*, but probably it is not properly referable to *E. Karstenii.*

EXOSTEMA Rich.

Shrubs or trees, glabrous or pubescent, the branches usually terete; stipules entire or bifid, persistent or deciduous; leaves petiolate or subsessile, membranaceous or coriaceous; flowers small or large, axillary and solitary or in terminal panicles or corymbs; hypanthium cylindric or obovoid; calyx usually 5-lobate; corolla tube often greatly elongate, the lobes oblong to elongate-linear, imbricate;

anthers commonly exserted; ovary 2-celled, many-ovulate; capsule usually oblong-cylindric, septicidally bivalvate, the valves entire or biparted; seeds imbricate, compressed, winged.—One other species is found in northern Central America.

Exostema caribaeum (Jacq.) Roem. & Schult. *E. longicuspe* Oerst. Vid. Medd. Kjoebenhavn 48. 1852 (Puntarenas, *Oersted*). Thickets of the Pacific coast. Extending to Mexico, West Indies, and southern Florida. A shrub or small tree, the branchlets glabrous; stipules 2.5–5 mm. long, the lobes cuspidate; leaves slender-petiolate, mostly ovate to elliptic-oblong, 5–11 cm. long, abruptly acuminate or long-acuminate, obtuse or acute at the base, membranaceous, barbate beneath in the axils of the nerves, otherwise glabrous; flowers axillary, solitary, white, pedicellate; calyx lobes 1 mm. long or shorter; corolla glabrous, the tube 3–5 cm. long, 2 mm. thick, the 5 lobes linear, about equaling the tube; anthers linear, 2 cm. long; capsule oval or ellipsoid, 1–1.5 cm. long.

FARAMEA Aubl.

Shrubs or small trees, usually glabrous throughout; stipules persistent, short-triangular and long-aristate, or often united to form a narrow sheath; leaves petiolate or subsessile, most often coriaceous; inflorescence usually terminal, sometimes axillary, few- or many-flowered; calyx truncate or dentate; corolla salverform, the 4 lobes valvate, the throat naked; ovary 1-celled; fruit baccate or almost dry, by abortion 1-seeded, the seed horizontal, deeply excavate on the lower side.—Several other species occur in Central America.

Faramea eurycarpa Donn. Smith, Bot. Gaz. 44: 113. 1907. Forests near Las Vueltas, Tucurrique, 700 meters, *Tonduz 12880*. Collected also at La Hondura, Prov. San José, and at Pejivalle, 700–1,700 meters. Endemic. A glabrous shrub of 2.5–3.5 meters; stipules united into a tube, but this caducous; leaves short-petiolate, oblong or oblanceolate-oblong, mostly 11–15 cm. long and 4–5 cm. wide, narrowly caudate-acuminate, acute or subobtuse at the base, yellowish when dried; panicles small, many-flowered, pedunculate, the flowers pedicellate; calyx 2 mm. long, lobate; corolla blue or violet, 10–11 mm. long, the lobes shorter than the tube; fruit 12 mm. broad, blue.

Faramea hondurae Standl. Journ. Wash. Acad. Sci. 18: 169. 1928. Wet forest, La Hondura, Prov. San José, 1,400 meters, *Standley 37890*. Endemic, and known only from the type locality.

A glabrous shrub of 3–4.5 meters; stipules sheathing, caducous, only 3–4 mm. long; leaves short-petiolate, narrowly oblong or lance-oblong, 12–19 cm. long, 3–5 cm. wide, caudate-acuminate, with a long, linear acumination, acute at the base; inflorescence cymose-paniculate, branched and many-flowered, the pedicels 2–3 mm. long; calyx 1–1.5 mm. long, shallowly lobate; corolla white, only 5 mm. long, the lobes shorter than the tube.

Faramea occidentalis (L.) Rich. Forests of the Pacific tierra caliente; Guanacaste. Southern Mexico to West Indies and northern South America. A glabrous shrub or small tree with smooth, gray bark; stipules distinct, long-cuspidate, coriaceous, finally deciduous; leaves short-petiolate, coriaceous, oblong to oval or oblong-obovate, 6–18 cm. long, usually abruptly short-acuminate, acute at the base; inflorescences terminal and axillary, laxly cymose-paniculate, often few-flowered but also with numerous flowers; calyx truncate; corolla white, the tube about 15 mm. long, the lobes 12 mm. long; fruit black at maturity, broader than high, about 1 cm. in diameter. The flowers are fragrant.

Faramea quercetorum Standl. Journ. Wash. Acad. Sci. 18: 168. 1928. Oak forest near Quebradillas, north of Santa María de Dota, 1,800 meters, *Standley 42999.* Collected by Brenes between Guachipelín and Volcán de La Vieja, and by Endres, without locality. Endemic. A shrub or small tree of 2.5–4.5 meters, glabrous throughout; stipules persistent, short-connate, the subulate lobes 4–5 mm. long, the tube 2 mm. long; leaves short-petiolate, elliptic or elliptic-oblong, 7–9 cm. long, 2–4.5 cm. wide, acuminate, acute or obtuse at the base; flowers in terminal umbels, these sessile or pedunculate, mostly 5-flowered, the slender pedicels 8–18 mm. long; calyx truncate, 1 mm. long; corolla violet, the tube 13 mm. long, the lobes 8–10 mm. long; fruit 8 mm. broad. Easily recognized by the simply umbellate, few-flowered inflorescence.

Faramea suerrensis Donn. Smith, Bot. Gaz. 44: 112. 1907. *F. trinervia* var. *suerrensis* Donn. Smith, op. cit. 31: 115. 1901. Suerre, Llanuras de Santa Clara, 300 meters, *J. D. Smith 6589.* Collected also in El General and San Ramón. Endemic. A shrub of 3–4 meters, glabrous; stipules short-connate, the lobes rounded and mucronate, deciduous; leaves short-petiolate, narrowly oblanceolate-oblong, up to 21 cm. long and 5.5 cm. wide, gradually attenuate into a long, narrow acumination, acute to attenuate at the base, very conspicuously 3-nerved; inflorescence cymose-corymbose, dense and many-flowered, long-pedunculate, the flowers short-pedicellate; calyx 1 mm. long, dentate; corolla deep blue, 6 mm. long. *Pittier 3912* in herb. Berlin, from El General, was indicated by Schumann as a new species, but is apparently referable here.

Faramea talamancarum Standl. Field Mus. Bot. 4: 332. 1929. Talamanca Valley, Panama, *M. A. Carleton 135*. Common in wet forests of the tierra caliente; region of San Ramón; Guanacaste; at 1,200 meters or less. Panama. A slender, glabrous shrub, usually 2 meters high or less; stipules united into a narrow sheath 8–9 mm. long, persistent; leaves short-petiolate, oblong-elliptic to narrowly oblong, mostly 11–16 cm. long, thin, cuspidate-acuminate, acute at the base; inflorescence cymose-corymbose, many-flowered, usually long-pedunculate, the slender pedicels mostly 8–10 mm. long; calyx truncate, 0.6 mm. long; corolla blue, the slender tube 10–12 mm. long, the lobes 5–7 mm. long. Like other blue-flowered Farameas, this must be a handsome shrub. Here probably belong *F. salicifolia* Presl, f. *subumbellata* and f. *paniculata* Kuntze (Rev. Gen. 1: 282. 1891), described from Costa Rica. *F. talamancarum* is closely related to that South American species, and may, indeed, prove to be synonymous with it.

Faramea trinervia Schum. & Donn. Smith, Bot. Gaz. 31: 115. 1901. In forest, Boca Zhorquín, Talamanca, *Tonduz 8571*. Forests of Tsaki, *Tonduz 9583*. Endemic. Glabrous; stipules 6–8 mm. long, semiconnate, the lobes rounded and aristate; leaves subsessile, narrowly oblong, 20–25 cm. long, 6–9.5 cm. wide, cuspidate-acuminate, subcordate at the base, very conspicuously 3-nerved; inflorescence cymose-corymbose, rather dense and many-flowered, pedunculate, the pedicels 5–11 mm. long; calyx denticulate; corolla unknown. Easy of recognition on account of the sessile leaves, subcordate at the base.

GALIUM L.

Reference: Greenman, Proc. Amer. Acad. 33: 455. 1898.

Annual or perennial herbs with slender, 4-angulate stems; leaves in verticels of 4 or more; flowers minute, 3–4-parted, in axillary and terminal, few-flowered cymes, ebracteate, the hypanthium articulate with the pedicel; calyx obsolete; corolla rotate, the lobes valvate; anthers exserted; ovary 2-celled, with 2 short styles, the cells 1-ovulate; fruit didymous, dry or fleshy.—A few other species probably occur in northern Central America.

Galium Aschenbornii Schauer. Las Cóncavas, south of Cartago, *Lankester 262*. Extending to Mexico. Perennial, the stems reclining, 50 cm. long or less, glabrous or minutely hispidulous; leaves in 4's, linear-oblong or elliptic-oblong, 1.5 cm. long or less, acute or cuspidate, glabrous but hispidulous on the margins; corolla lobes cuspidate; fruit glabrous, orange-colored.

Galium mexicanum HBK. Cartago, 1,650 meters, *Cooper 5797*. Panama to Mexico. Perennial, the stems much branched, aculeolate-hispid on the angles; leaves 6–8 in a whorl, linear, 2 cm. long or less, the margins revolute, cuspidate, uncinate-hispidulous on the margins and on the nerves beneath; corolla white or purplish, pubescent outside; fruit covered with short, uncinate, whitish hairs.

Galium obovatum HBK. Occasional in forests of the central region; region of Dota; at 1,450–3,300 meters. Guatemala to Bolivia. Plants slender and much branched, ascending or sometimes scandent, the stems pilose with weak, whitish, spreading hairs, sometimes glabrate; leaves in 4's, ovate to elliptic or obovate, mostly 5–15 mm. long, obtuse to acuminate, acute at the base, densely pilose on both surfaces or rarely glabrate, 3-nerved; corolla yellowish or whitish, the lobes caudate-acuminate; fruit densely uncinate-hispid. The Costa Rican material is variable in shape and size of the leaves, and it is quite possible that it represents more than a single species.

GARDENIA Ellis

Shrubs or small trees, usually unarmed; stipules acute or acuminate, triangular; leaves commonly opposite; flowers large, axillary and solitary or rarely terminal and corymbose; calyx tubular, spathaceous, or parted; corolla salverform or funnelform, with an elongate tube, usually glabrous in the throat, the lobes 5–9; ovary commonly 1-celled; fruit usually baccate, the seeds numerous, horizontal.—All the species are natives of the Old World.

Gardenia augusta (L.) Merrill. *Jazmín del cabo. G. jasminoides* Ellis; *G. florida* L. Planted commonly for ornament. Native of southern China. A densely branched shrub, the branchlets scabrous-puberulent; stipules 1 cm. long; leaves short-petiolate, coriaceous, obovate or oblong-obovate, obtuse or acute, narrowed to the base, almost glabrous; flowers white, large and showy, usually double in cultivated plants, very fragrant; calyx lobes foliaceous, 2–2.5 cm. long. The gardenia, well known in the north as a hothouse plant, is one of the favorite garden shrubs of Central America.

GENIPA L.

Tall trees, glabrous or pubescent; stipules deciduous; leaves rather large, opposite, petiolate, subcoriaceous; flowers large, 5–6-parted, in terminal, few-flowered cymes; calyx tubular, truncate or shallowly lobate; corolla salverform or subrotate, coriaceous, the lobes contorted, the tube short, villous in the upper half; stamens exserted, the anthers linear; fruit baccate, large, ovoid or globose, 2-celled; seeds large, horizontal or oblique, compressed.—One or two other species are known from Central America.

Genipa americana L. *Guaitil.* Frequent in forests of the tierra caliente. Southern Mexico to Peru and Brazil. A tree of 14 meters or less, the crown spreading, the branchlets glabrous, densely leafy; stipules triangular, acuminate, 8–12 mm. long; leaves short-petiolate, oblong to obovate, 15–30 cm. long, acute or short-acuminate, narrowed to the acute base, glabrous; inflorescence short-pedunculate, the pedicels 4–10 mm. long; calyx 5–8 mm. long, truncate or undulate, glabrous; corolla yellowish white, 2–4.5 cm. long, the lobes longer than the tube; fruit 6–7 cm. in diameter; seeds 6–12 mm. long. The wood is strong, resistant, and flexible, in its properties being somewhat like the wood of hickory (*Carya*) of the United States. It is used for many purposes. The pulp of the fruit is edible, but dark and repulsive in appearance, and not particularly palatable. Its dark juice leaves an indelible stain upon every object that it touches. By some of the American aborigines it was used for painting their bodies, giving a dark blue or almost black color.

Genipa americana var. **Caruto** (HBK.) Schum. The only Costa Rican specimen I have seen is from Guanacaste, but the tree is doubtless more widely distributed in the country. The variety has a narrower distribution than typical *G. americana*, and is by far the commoner form found in continental North America. Differs from typical *G. americana* in the abundant, dense pubescence of the branches and lower leaf surface. The Térraba name is reported as Brir.

Genipa codonocalyx Standl. Contr. U. S. Nat. Herb. 17: 446. 1914. *Jagua.* Near Boca Matapalo, Pacific coast, *Pittier 12085.* Known only from the original collection. A tree, the branchlets glabrous or sparsely short-pilose; stipules triangular-ovate, acuminate, 10–12 mm. long; leaves short-petiolate, oblong-oblanceolate or narrowly oblong, 12–17 cm. long, 4–7 cm. wide, abruptly short-acuminate, attenuate to the acute base, glabrous and lustrous above, paler beneath, short-pilose on the nerves; cymes subsessile, lax, the pedicels 3–7 mm. long; calyx and hypanthium glabrous, the calyx only 3–3.5 mm. long, truncate; corolla yellowish white, 2.5 cm. long, the lobes sericeous, longer than the tube. The wood is said to be very hard.

Genipa venosa Standl. Journ. Wash. Acad. Sci. 18: 168. 1928. Dense, wet forest, El Arenal, Guanacaste, 485 meters, *Standley & Valerio 45269*. Known only from the original collection. A tree of 9–15 meters; petioles 3.5–4 cm. long; leaf blades obovate-oblong, 29–35 cm. long, 12–14 cm. wide, rounded or obtuse at the apex and linear-cuspidate, gradually attenuate to the obtuse base, glabrous or glabrate above, brown-tomentose beneath along the nerves or glabrate, the veins prominent and closely reticulate; inflorescence few-flowered, the branches thick; fruits green, subglobose or oval, as much as 10 cm. long or even larger, smooth, rounded at the apex. I have not seen specimens of this tree recently, and have a suspicion that it may belong to some other genus than *Genipa*.

GEOPHILA Don

Creeping herbs; leaves long-petiolate, membranaceous, ovate-cordate or rounded-cordate; flowers small, in terminal, pedunculate, few-flowered heads, the heads subtended by 2 free bracts; calyx dentate or lobate; corolla tubular-funnelform, pilose in the throat; ovary 2-celled; fruit fleshy, drupaceous, the 2 nutlets plano-convex, dorsally compressed, usually costate.—One other species has been found in Central America.

Geophila herbacea (Jacq.) Schum. Frequent in shaded places of the tierra caliente, often a weed in banana plantations. Generally distributed in tropical America. Plants slender, almost glabrous, rooting at the nodes; leaves long-petiolate, the blades rounded-ovate or subreniform, deeply cordate at the base, 3–4 cm. long; heads long-pedunculate, usually 3–5-flowered; calyx lobes lanceolate, acuminate; corolla white or purplish, often 1 cm. long; fruit red or almost black, the nutlets somewhat spirally twisted.

GOMOZIA Mutis

Creeping, perennial herbs; stipules connate with the petioles to form a sheath, bidentate or entire and triangular; leaves small, opposite; flowers minute, axillary, sessile; calyx truncate or dentate, persistent; corolla tubular or funnelform, glabrous in the throat, the

4 lobes valvate; anthers exserted; fruit drupaceous, containing two 1-seeded nutlets.—A single species grows in North America.

Gomozia granadensis L. *Nertera depressa* Banks & Soland. Abundant in moist forest of the mountains, mostly at 1,600–3,000 meters; region of San Ramón. Widely distributed in the higher mountains from Mexico to Chile. Plants small and slender, almost glabrous, forming dense, close mats on banks or logs, the stems much branched; leaves petiolate, the blades rather thick, mostly 1 cm. long or less, ovate to deltoid-ovate or ovate-orbicular, obtuse, puncticulate above; corolla white or greenish yellow; fruits bright red, juicy, 3–4 mm. long. The plant is a pretty one when in fruit because of the abundance of small but brightly colored berries. In general appearance it suggests the partridge berry (*Mitchella repens*, Rubiaceae) of the United States. It is unfortunate that the long established generic name *Nertera* must be relegated to synonymy, but the genus is such a small and unimportant one that there is little reason for placing *Nertera* on the list of nomina conservanda.

GONZALAGUNIA Ruiz & Pavón

Shrubs or small trees, usually abundantly pubescent, the branches slender, terete; leaves opposite, petiolate or subsessile; flowers small, sessile or pedicellate, in slender, elongate, terminal spikes or thyrsiform panicles; hypanthium globose or campanulate; calyx usually 4-lobate, the lobes equal or unequal, persistent; corolla funnelform or salverform, the tube short or elongate, the lobes short, spreading, valvate or imbricate; anthers included; ovary 2- or 4-celled, the ovules numerous; fruit baccate, depressed-globose, the 2 or 4 lobes chartaceous or osseous, many-seeded; seeds minute, foveolate.—One or two other species probably occur in Central America.

Gonzalagunia bracteosa (Donn. Smith) Robinson, Proc. Amer. Acad. 45: 405. 1910. *Gonzalea bracteosa* Donn. Smith, Bot. Gaz. 33: 252. 1902. *Duggena bracteosa* Standl. Contr. U. S. Nat. Herb. 18: 125. 1916. Forests near Suerre, Llanuras de Santa Clara, 300 meters, *J. D. Smith 6583*. Forests of the Atlantic tierra caliente. Endemic. A shrub of 3 meters, the branchlets pilose-sericeous; stipules 1.5–2 cm. long; leaves petiolate, lanceolate to narrowly elliptic-oblong, 9–21 cm. long, 2–7 cm. wide, acute to attenuate, acute at the base, sparsely appressed-pilose above or glabrate, sparsely appressed-pilose beneath; flower cymules sessile, subtended by foliaceous bracts 5–12 mm. long; flowers 4 mm. long; calyx lobes short, triangular; corolla strigose; fruit black, 4 mm. in diameter, 2-celled.

Gonzalagunia Brenesii Standl., sp. nov.—Ramuli teretes fusco-brunnei, breviter strigosi vel fere glabri, internodiis elongatis; stipulae ca. 8 mm. longae e basi triangulari subulato-attenuatae extus dorso marginibusque sericeae; folia magna breviter petiolata subcoriacea, petiolo crasso vix ad 5 mm. longo; lamina anguste oblongo-lanceolata 12–19 cm. longa 3.5–5.5 cm. lata longissime sensim attenuata, basi anguste obtusa, supra glabra lucidissima, ad costam prominentem puberula, nervis impressis, subtus fere ubique breviter sericea, costa gracili elevata, nervis lateralibus utroque latere ca. 14 prominentibus angulo latiusculo adscendentibus, venulis prominentibus laxe reticulatis; inflorescentia spiciformis pedunculata 21–25 cm. longa, cymulis sessilibus paucifloris remotis, bracteis minutis, floribus sessilibus vel breviter pedicellatis; ovarium vix 1 mm. longum dense minute sericeum 4-loculare; calyx vix 1 mm. longus brevissime dentatus glabratus, dentibus late obtusis; corolla extus dense adpresso-pilosula, tubo gracili 7 mm. longo.—Coastal forests of Golfito de Osa, April, 1930, *Brenes 12323* (type in Herb. Field Mus.). Conspicuous because of the very lustrous upper surface of the leaves, glabrous or nearly so, and the numerous pairs of lateral nerves.

Gonzalagunia ovatifolia (Donn. Smith) Robinson, Proc. Amer. Acad. 45: 405. 1910. *Gonzalea ovatifolia* Donn. Smith, Bot. Gaz. 27: 336. 1899. *Duggena ovatifolia* Standl. Contr. U. S. Nat. Herb. 18: 126. 1916. Atirro, Prov. Cartago, 600 meters, *J. D. Smith 6509.* Forests of the Atlantic tierra caliente. Panama. A slender shrub of 2–3 meters, the branchlets densely pilose-sericeous; stipules 6–8 mm. long; leaves subsessile, oval-ovate or broadly oblong-ovate, 8–12 cm. long, 3.5–6.5 cm. wide, acuminate to long-attenuate, rounded at the base, almost glabrous above, sericeous-strigose beneath; cymules few-flowered, sessile, the bracts 5 mm. long or less; calyx lobes 1–2 mm. long, oblong or elliptic, obtuse; corolla white, strigose, 3–3.5 mm. long; fruit white, 4-coccous, strigose.

Gonzalagunia panamensis (Cav.) Schum. Frequent in forests and thickets of the central region, descending to the Pacific tierra caliente; region of San Ramón; at 1,500 meters or less. Southern Mexico to West Indies and northern South America. A slender shrub or small tree, the branches densely strigose at first; stipules 3–8 mm. long; leaves short-petiolate, ovate or lanceolate, 7–14 cm. long, 2–6 cm. wide, acuminate or long-attenuate, obtuse or acute at the base, densely or sparsely strigillose above or glabrate, sparsely or densely pilose beneath or glabrate; inflorescence 10–24 cm. long, the cymules few-flowered, dense or remote, sessile or nearly so, the bracts 2–3 mm. long; calyx lobes deltoid, obtuse or acute; corolla white, 10–17 mm. long, the tube glabrous or sparsely pilose, the lobes 2–2.5 mm. long; fruit 4-coccous, 3–4 mm. in diameter, white.

Gonzalagunia rosea Standl. In forest, regions of San Ramón and Zarcero, San Pedro Coronado, and doubtless elsewhere, 1,400–2,100 meters. Adjacent Panama. A slender shrub or small tree, 1–4.5 meters high, the young branches densely pilose; stipules 6–7 mm. long; leaves short-petiolate, lance-oblong, 9–14 cm. long, 2.5–5 cm. wide, narrowly attenuate-acuminate, acute or subobtuse at the base, short-pilose above with mostly spreading hairs, densely soft-pilose beneath; inflorescence up to 30 cm. long, the cymules pedunculate, the bracts minute; calyx lobes broadly ovate, acute or subobtuse; corolla pink, white-strigose, the tube 6–8 mm. long, lobes 2 mm. long; fruit glabrate, 4-coccous, 2.5–3 mm. in diameter. Similar to *G. panamensis*, but distinguished by the mostly spreading pubescence of the leaves and by the pedunculate cymules.

GUETTARDA L.

Trees or shrubs; stipules deciduous; leaves opposite or ternate, petiolate or subsessile, membranaceous to rigid-coriaceous; flowers small or large, in axillary, bifurcate or congested cymes, usually secund; hypanthium ovoid or globose, the calyx tubular or cupular, truncate or very obscurely dentate, deciduous; corolla funnelform or salverform, the tube elongate, the throat naked, the 4–9 lobes obtuse, imbricate; anthers included; ovary 2–9-celled, the cells tubular, elongate, 1-ovulate; fruit drupaceous, globose to oblong, sometimes acutely angulate, the flesh very thin, the stone ligneous or osseous.—A few other species have been found in Central America.

Guettarda Brenesii Standl., sp. nov.—Ramuli crassiusculi teretes fusci pallide lenticellati, novellis pilis brevibus patentibus dense hirtellis; stipulae deciduae ca. 8 mm. longae brunneae oblongo-ovatae acutae extus sericeae; folia breviter petiolata membranacea, petiolo usque 6 mm. longo dense adpresso-hirtello; lamina late ovata vel late ovato-elliptica 4–6.5 cm. longa 3–4.5 cm. lata, apice obtusa vel subrotundata atque apiculata, basi subrotundata breviter cordata, supra viridis sparse hispidula, nervis vix elevatis, subtus pilis plerumque patentibus nitidis intertextis piloso-tomentosa; cymae axillares dense multiflorae 2.5–3 cm. longe pedunculatae, usque 2 cm.

latae, breviter ramosae, floribus sessilibus, pedunculo dense hispidulo, bracteolis calyce longioribus oblongo-ovatis brunneis longiciliatis; hypanthium subglobosum 1 mm. longum dense strigillosum; calyx truncatus ca. 1.2 mm. longus sparse strigillosus vel glabratus; corolla extus dense minute sericea, tubo gracili 9 mm. longo, lobis ca. 2 mm. longis.—Isla de Caballo, Golfo de Nicoya, June, 1932, *Brenes 15694* (type in Herb. Field Mus.). The available material is fragmentary, but adequate to show that it represents a species different from all others known from Central America. It is probably related to *G. macrosperma*, but differs in the abundant, spreading pubescence of the lower leaf surface, and in the much smaller flowers.

Guettarda conferta Benth. Bot. Voy. Sulph. 106. 1845. *Mathiola conferta* Kuntze, Rev. Gen. 1: 288. 1891. Cocos Island, *Barclay*. Known only from the original collection. Plant with dense, ferruginous hairs on the branchlets, petioles, peduncles, and nerves of the leaves; stipules broadly obovate, 12 mm. long, hirsute outside at the base, otherwise glabrous, about equaling the petioles; blades ovate, 10–15 cm. long, acuminate, acute at the base, hirsute on both sides; cymes subsessile, the branches recurved, 2.5 cm. long or less, the flowers 8 mm. long; calyx shallowly 3–4-dentate; corolla sericeous-hirtous, the 4 lobes short, obtuse, crispate; fruit ovoid-tetragonous, 4 mm. long, hirsute, 4-celled. I know the species only from the description, and have seen no Cocos Island material of the genus.

Guettarda crispiflora Vahl. *Mosquito (mosqueta?) de montaña* (*Tonduz*). Frequent in forests of the central region; mountains of San Ramón and Zarcero; at 1,150–1,500 meters. Lesser Antilles and Trinidad. A shrub or tree, sometimes 8 meters high, the trunk to 15 cm. in diameter, the bark gray; stipules ovate, 1–2 cm. long, acute or acuminate, setose-pilose at the base and along the costa; leaves petiolate, ovate to broadly oval, 9–12 cm. long, 4.5–7 cm. wide, rounded or obtuse at the apex and abruptly acuminate, broadly rounded at the base; cymes short-pedunculate, bifurcate, the branches 1–3 cm. long, the bractlets minute; calyx and hypanthium densely fulvous-sericeous; corolla white or tinged with pink, the tube 12–15 mm. long, densely retrorse-pilose, the lobes 3 mm. long, lacerate-undulate; fresh fruit as much as 2 cm. long, violet-blackish, the dried fruit acutely tetragonous, 5–7 mm. long.

Guettarda macrosperma Donn. Smith. In thickets or dry forest, Meseta Central to the Pacific coast; Guanacaste; Changuinola Valley. Panama to Guatemala. A shrub or small tree, sometimes

7 meters high, with a trunk 10 cm. in diameter; stipules ovate-deltoid, about 4 mm. long, filiform-acuminate; leaves slender-petiolate, membranaceous, oval to oblong, 5–13 cm. long, 2.5–7 cm. wide, acute to acuminate, rounded to subacute at the base, hispidulous above when young but soon glabrate, minutely and usually sparsely appressed-pilose beneath; cymes few-flowered, at first dense, in fruit more open, pedunculate, the bractlets subulate, shorter than the calyx; calyx and hypanthium tomentulose, the calyx 2–2.5 mm. long; corolla white, sericeous outside, the tube 12 mm. long; fruit terete, subglobose, 1–1.5 cm. or more in diameter, often dark red, 3–4-celled.

Guettarda poasana Standl. Journ. Wash. Acad. Sci. 18: 182. 1928. Wet forest, Viento Fresco, slopes of Volcán de Poás, Prov. Alajuela, 1,800 meters, *Standley & Torres 47807*. Collected also at Río Poás, and at Las Nubes, Prov. San José, at 1,800–2,100 meters. Endemic. Closely related to *G. crispiflora*, but differing in its glabrous stipules and glabrous or nearly glabrous hypanthium and calyx; corolla pink, the tube 15–20 mm. long.

HAMELIA Jacq.

Shrubs or small trees, glabrous or pubescent; stipules deciduous; leaves opposite or verticillate, petiolate, usually membranaceous; flowers yellow or red, small or large, usually in terminal, scorpioid cymes, sessile or pedicellate; calyx 5-lobate, the lobes short or elongate, persistent; corolla tubular or funnelform, the tube 5-costate, the throat glabrous, the lobes short, imbricate; anthers included or semi-exserted; ovary 5-celled, many-ovulate; fruit small, baccate, ovoid to cylindric, 5-celled; seeds numerous, minute, angulate, foveolate. —A few other species are native in Central America.

Hamelia axillaris Swartz. Occasional in forests of the tierra caliente. British Honduras to West Indies, Brazil, and Peru. A slender shrub or small tree, the branches glabrous or minutely puberulent when young; leaves opposite, petiolate, elliptic or oblong-elliptic, 5–12 cm. long, abruptly acuminate, acute at the base, glabrous above, glabrous beneath or minutely puberulent on the nerves; inflorescence few–many-flowered, lax, pedunculate, the flowers sessile or subsessile, secund; calyx and hypanthium 3 mm. long, minutely puberulent or glabrate, the calyx lobes oblong or linear-oblong, obtuse; corolla yellow, 1–1.5 cm. long, glabrous or nearly so, the limb dilated, 3–4 mm. broad; fruit globose-ellipsoid, 5–6 mm. long.

Hamelia costaricensis Standl. Contr. U. S. Nat. Herb. 20: 207. 1919. Surubres, near San Mateo, *Biolley 2656*. Collected also at

Taus and Carrillos de Poás; ascending to 1,600 meters. Endemic. Branchlets densely puberulent; leaves opposite, slender-petiolate, oval-ovate to oval-elliptic or obovate-oblong, 8–19 cm. long, 4–10 cm. wide, acute or acuminate, rounded or obtuse and short-decurrent at the base, minutely puberulent beneath on the nerves or almost glabrous; inflorescence pedunculate, branched, many-flowered, the flowers secund, sessile; calyx and hypanthium densely puberulent, the calyx lobes subulate, 1–1.5 mm. long; corolla densely fulvous-puberulent, becoming glabrate, the tube 22 mm. long, ampliate above, 6–7 mm. wide in the throat, the lobes rounded, 5 mm. long, spreading.

Hamelia magnifolia Wernham, Journ. Bot. 49: 210. 1911. *Zorrillo colorado.* Río Corozal, near Santo Domingo de Golfo Dulce, *Tonduz 10091.* Collected also at Tilarán, Guanacaste, 700 meters. Panama. A shrub or small tree, 6 meters high or less, the trunk 8 cm. or less in diameter, the branchlets glabrous or minutely puberulent when young; leaves opposite, slender-petiolate, oblanceolate or obovate, 10–28 cm. long, 3–11 cm. wide, abruptly acuminate or long-acuminate, acute to long-attenuate at the base, glabrous or minutely puberulent beneath on the nerves; cymes many-flowered, short-pedunculate, the branches short, the flowers sessile, subsecund; calyx and hypanthium 3 mm. long, puberulent or glabrate, the calyx lobes minute, broadly deltoid; corolla yellow, subcylindric, 15 mm. long, glabrous or obscurely puberulent, the lobes 1 mm. long; fruit oblong-ellipsoid, 5–8 mm. long.

Hamelia nodosa Mart. & Gal. *H. viridifolia* Wernham, Journ. Bot. 49: 213. 1911 (without locality, *Tonduz 13867*). Frequent in thickets and forest of the tierra caliente, at least on the Pacific slope; region of San Ramón; Guanacaste; at 1,100 meters or less. Panama to southern Mexico. A shrub or small tree, 6 meters high or less, the branches glabrous or when young sparsely puberulent; leaves mostly in whorls of 4, short-petiolate, the blades elliptic-oblong to elliptic or ovate, 4–9 cm. long, 2–4 cm. wide, acute or short-acuminate, rounded to attenuate at the base, glabrous above, beneath villosulous or puberulent on the nerves or glabrate; inflorescence many-flowered, the flowers sessile or nearly so, secund; calyx and hypanthium 3–4 mm. long, sparsely puberulent, the calyx lobes minute, deltoid; corolla red, tubular, 18–22 mm. long, minutely puberulent, the lobes 1 mm. long; fruit oblong-cylindric, 8–10 mm. long. This may be no more than a form or variety of *H. patens*.

Hamelia patens Jacq. *Zorrillo, Azulillo, Zorrillo real, Coralillo, Pissí, Palo camarón, Añileto.* Frequent in forests and thickets of the central region, descending to the Pacific coast, at 1,700 meters or less; Guanacaste. Generally distributed in tropical America. A shrub or small tree, sometimes 6 meters high, the branchlets villous or puberulent; leaves mostly ternate, slender-petiolate, lance-oblong to elliptic or ovate, 6–20 cm. long, 2–9 cm. wide, short-acuminate, rounded to acuminate at the base, puberulent or villosulous above, sometimes glabrate, beneath usually abundantly villosulous or puberulent; inflorescence many-flowered, the branches often much elongate in fruit, the flowers secund, sessile or short-pedicellate; calyx and hypanthium 2.5–3 mm. long, puberulent or villous, the calyx lobes minute, deltoid; corolla orange-red, tubular, 15–20 mm. long, sparsely or densely puberulent or villosulous, the lobes minute; fruit red to almost black, juicy, 6–10 mm. long. As Indian names Pittier reports Tsus-krá (Brunka) and Pilií-tso (Guatuso).

Hamelia Rovirosae Wernham. In thickets, Atlantic tierra caliente. Panama to southern Mexico. A shrub or small tree, sometimes 5 meters high, the branchlets sparsely or densely villous; leaves ternate, short-petiolate, elliptic-oblong to oval-elliptic, 5–15 cm. long, 2–5 cm. wide, acute or short-acuminate, acute or acuminate at the base, glabrous or sparsely villous above, sparsely or densely villous beneath along the nerves; inflorescence few–many-flowered, short-pedunculate, lax, the branches short or elongate, the flowers sessile or subsessile, usually secund; calyx and hypanthium sparsely or densely villous, the calyx lobes narrowly oblong, obtuse, 2–5 mm. long, reflexed; corolla dull red or orange-red, villous, 18–24 mm. long, gradually ampliate above, 6 mm. wide in the throat, the lobes 1.5–2 mm. long; fruit ovoid, 8 mm. long, red or purple, sparsely or densely villous.

Hamelia Rowleei Standl. Journ. Wash. Acad. Sci. 15: 7. 1925. Livingston, on the Río Reventazón, *Rowlee & Stork 75.* Changuinola Valley. Panama. A shrub, the branchlets pilose with long, spreading hairs; leaves opposite, slender-petiolate, elliptic-obovate or elliptic, 15–19 cm. long, 6–9 cm. wide, abruptly short-acuminate, cuneate-attenuate at the base or abruptly contracted and decurrent, villosulous above along the costa, sparsely pilose or glabrous elsewhere, copiously pilose beneath with long, stiff, spreading hairs; inflorescence with few or numerous branches, many-flowered, the flowers secund, sessile or nearly so; hypanthium oblong-turbinate, densely villous, the calyx lobes deltoid-subulate, 1.5 mm. long;

corolla puberulent or short-pilose, the tube 28 mm. long, slightly dilated above, the lobes acuminate, 4–5 mm. long, spreading.

Hamelia Storkii Standl. Changuinola Valley. Panama. A shrub or small tree, as much as 4.5 meters high, with a trunk 5 cm. in diameter, the branches glabrous; leaves opposite, slender-petiolate, elliptic to oblanceolate-elliptic, 12–22 cm. long, 4–9 cm. wide, acuminate, acute at the base, sparsely barbellate beneath in the axils of the nerves, elsewhere glabrous, or sometimes sparsely short-pilose beneath; inflorescence with few or numerous branches, these often 10 cm. long, the flowers secund, sessile or nearly so; hypanthium glabrous; calyx lobes triangular-oblong, 1.5 mm. long; corolla yellow, 2.5–3 cm. long, tubular, slightly dilated above, 4 mm. broad in the throat, the lobes ovate, 3–4 mm. long; fruit oblong, 10–12 mm. long.

Hamelia xerocarpa Kuntze, Rev. Gen. 1: 284. 1891. "Baguar," 600 meters, *Kuntze*. Nicaragua. A tall shrub, the branches fulvous-villous; leaves opposite, the petioles 2.5 cm. long, villous, the blades elliptic-obovate or elliptic-oblong, 13.5–15.5 cm. long, 6–6.5 cm. wide, acuminate, acute at the base, glabrous above or nearly so, fulvous-villous beneath; flowers sessile, secund; calyx and hypanthium densely fulvous-villous, the calyx lobes lance-subulate, 1–1.5 mm. long; corolla subfunnelform, 1.5 cm. long, 2.5 mm. wide in the throat, densely villous, the lobes broad, acuminate, 3–4 mm. long; fruit cylindric, 1.5 cm. long, 4 mm. thick, villous.

HEMIDIODIA Schum.

Perennial herbs, sometimes suffrutescent at the base; stipules united with the petioles into a setiferous sheath; leaves opposite, conspicuously nerved; flowers sessile and densely clustered in the leaf axils; sepals 4, equal, connate at the base; corolla small, white, funnelform, the 4 lobes valvate; stamens exserted; fruit of 2 carpels, these 1-seeded, separating from the central septum, opening near the base.—The genus consists of a single species.

Hemidiodia ocimifolia (Willd.) Schum. Frequent in thickets or waste ground of the tierra caliente, ascending to La Hondura, at 1,200 meters; Guanacaste; region of San Ramón. Widely distributed in tropical America. Stems often much elongate, decumbent or ascending, sparsely puberulent or glabrate; leaves petiolate, lanceolate or lance-oblong, 3–5 cm. long or larger, acuminate, puberulent or glabrate, scabrous on the margins; sepals ovate, acute, 0.5 mm. long; corolla glabrous, 3–4 mm. long; fruit 3–4 mm. long, puberulent or glabrous.

HILLIA Jacq.

Shrubs, usually epiphytic, glabrous; leaves opposite, petiolate, fleshy, coriaceous when dried; stipules membranaceous, caducous; flowers large, white, terminal, solitary, subsessile; hypanthium obovoid or cylindric; calyx none or of 2–4 foliaceous, caducous lobes; corolla salverform, the tube elongate, the throat ampliate, naked, the limb 3–7-lobate, the lobes spreading, contorted; anthers included; ovary 2-celled, many-ovulate; capsule elongate-oblong or cylindric, septicidally bivalvate; seeds imbricate, produced at the base into an appendage and at the apex into a tuft of hairs.—At least one other species occurs in Central America.

Hillia chiapensis Standl. *Jazmín del volcán.* Forests of the Pacific tierra caliente; region of Zarcero; Guanacaste; collected by Wercklé at some unspecified locality with an elevation of 1,600 meters. Southern Mexico. A densely branched, epiphytic shrub; stipules oblong to obovate, 3–4 mm. long, rounded at the apex; petioles 2–5 mm. long; leaf blades elliptic or oval to oblong-elliptic, 9–14 mm. long, 4–7 mm. wide, rounded at the apex, obtuse or acutish at the base, the lateral nerves inconspicuous; corolla tube 15 mm. long, the lobes 7 mm. long; capsule about 2 cm. long, the valves after dehiscence 3–4 mm. wide.

Hillia loranthoides Standl. Journ. Wash. Acad. Sci. 18: 165. 1928. *Jazmín del monte, Montano.* Moist forest, Quebrada Serena, southeast of Tilarán, Guanacaste, 700 meters, *Standley & Valerio 46152.* Region of San Ramón, at about 1,100 meters. Endemic. A large, epiphytic shrub; stipules elliptic-oblong, 18 mm. long, 6–8 mm. wide, obtuse; petioles stout, 8 mm. long or less; leaf blades elliptic to oblong-ovate, 5–7 cm. long, very thick, acutely narrowed to the obtuse apex, obtuse or acute at the base, the lateral nerves obscure, about 4 on each side, ascending at a narrow angle; corolla tube about 5 cm. long, the broad lobes 2 cm. long; capsule cylindric, 3 cm. long, 7 mm. thick. Like other species of the genus, this is a very handsome plant when in flower.

Hillia Maxonii Standl. Mountains of the central region and in Dota and San Ramón, at 1,250–2,400 meters. Nicaragua. An epiphytic shrub, the branches sometimes 5 meters long and pendent; stipules broadly obovate, 12 mm. long, rounded at the apex; petioles 3–4 mm. long; leaf blades oval to oval-obovate, 2–3.5 cm. long, 1–2 cm. wide, broadly rounded at the apex, somewhat narrowed to the obtuse or acute base, coriaceous, the costa and lateral nerves obscure;

calyx lobes oblong-linear, 8 mm. long, green, rounded at the apex; corolla tube 5 cm. long, the lobes almost 2 cm. long; capsule cylindric, 3 cm. long.

Hillia palmana Standl. Journ. Wash. Acad. Sci. 18: 164. 1928. Between La Palma and La Hondura, Prov. San José, 1,500–1,700 meters, *Maxon & Harvey 8045*. Known only from the original collection. Stipules oblong or spatulate-oblong, 13–20 mm. long, rounded at the apex; petioles 3 mm. long or less; leaf blades narrowly spatulate-oblong or oblong-cuneate, 1.5–3.5 cm. long, 5–11 mm. wide, broadly rounded at the apex, gradually narrowed to the long-attenuate base, the venation obsolete; corolla tube 3.5 cm. long, the lobes suborbicular, 1 cm. long.

Hillia Valerii Standl. Journ. Wash. Acad. Sci. 18: 164. 1928. *Azaharcillo*. Between La Palma and La Hondura, Prov. San José, 1,500–1,700 meters, *Maxon & Harvey 8092*. Frequent in forests of the central region; region of San Ramón; at 1,200–1,700 meters. Endemic. An epiphytic shrub, sometimes 2 meters long; stipules spatulate-obovate, 3–4 cm. long, broadly rounded at the apex; petioles stout, 5–10 mm. long; leaf blades obovate-oblong or narrowly obovate, 5–8 cm. long, 2–3.5 cm. wide, broadly rounded at the apex, long-attenuate to the base, coriaceous, the lateral nerves about 6 on each side; calyx lobes ovate-oval, obtuse, 4–5 mm. long; corolla tube 8 cm. long, the oval lobes 3 cm. long; capsule columnar, terete, 6–7.5 cm. long, 8 mm. in diameter. Specimens of this species have been referred to *H. tetrandra* Swartz, a species of the West Indies and of other regions of Central America, but apparently unknown in Costa Rica.

HOFFMANNIA Swartz

Shrubs or herbs, glabrous or pubescent, the branches terete or tetragonous; leaves opposite or verticillate, usually membranaceous; stipules deciduous or persistent; flowers small, white, yellow, or red, cymose, the cymes axillary, sessile or pedunculate; hypanthium oblong or turbinate; calyx usually 4-lobate, the lobes short, persistent; corolla funnelform to almost rotate, the tube short or elongate, the throat glabrous, the limb commonly 4-lobate, the lobes obtuse or acute, imbricate; anthers exserted; ovary 2-celled, many-ovulate; fruit small, baccate, 2-celled; seeds numerous, minute, foveolate.—The genus consists of a large number of species, most of them much alike in general appearance, and separated only by slight characters, which, however, appear to be usually constant. Because of the large number of species and the difficulty of separating them, there is reproduced here the key published in the *North American Flora,* so far as it applies to Costa Rican plants of the genus. In some of the species the form of the corolla is unknown or uncertain, and on this account they appear twice in the key. The genus ranges from Mexico to the southern Andes, but is represented in Costa Rica by a larger number of species than in any other region.

Lobes of the corolla twice as long as the tube or longer.
  Cymes long-pedunculate, longer than the petioles, the peduncles equaling or longer than the cymes.
    Stems herbaceous, low; corolla bright red .... *H. refulgens.*
    Stems woody, elongate; corolla red, green, or yellow.
      Leaves sessile, the base dilated and clasping. *H. subauriculata.*
      Leaves petiolate.
        Fruit white; flowers long-pedicellate; corolla red. *H. leucocarpa.*
        Fruit red; flowers partly sessile; corolla pale green. *H. pallidiflora.*
  Cymes sessile or short-pedunculate, usually shorter than the petioles, the peduncles shorter than the cymes.
    Leaves conspicuously puberulent or villosulous beneath with ferruginous hairs; corolla more or less villous.
      Leaves essentially sessile, the blades decurrent to the base of the petiole.
        Cymes lax, many-flowered; base of the leaf blade deeply cordate and clasping .... *H. amplexifolia.*
        Cymes dense, few-flowered; base of the blade acute. *H. ramonensis.*
      Leaves conspicuously petiolate.
        Leaf blades chiefly obovate, broadest above the middle. *H. hamelioides.*
        Leaf blades mostly elliptic, broadest at the middle.
          Lateral nerves of the leaves 5–8 pairs .... *H. Valerii.*
          Lateral nerves of the leaves about 12–13 pairs. *H. asclepiadea.*
    Leaves glabrous beneath or obscurely grayish-puberulent; corolla glabrous or puberulent.
      Calyx lobes linear or narrowly triangular, very acute. *H. Tonduzii.*

Calyx lobes broadly deltoid or ovate, obtuse.

Leaves sessile or essentially so, the blade decurrent to the base of the petiole.................. *H. carpinterae.*

Leaves conspicuously petiolate.

Leaf blades broadest above the middle. *H. longepetiolata.*

Leaf blades mostly broadest at the middle. *H. inamoena.*

Lobes of the corolla equaling or shorter than the tube, or but slightly exceeding it.

Leaf blades dilated and clasping at the base.... *H. subauriculata.*

Leaf blades not dilated and clasping at the base.

Corolla pubescent outside.

Leaves glabrous beneath.

Calyx lobes elongate, acute...................... *H. nesiota.*

Calyx lobes broadly deltoid, obtuse........ *H. arborescens.*

Leaves villosulous beneath, or rarely puberulent, at least along the nerves.

Leaves merely puberulent beneath along the nerves. *H. inamoena.*

Leaves villosulous beneath.

Cymes long-pedunculate..................... *H. affinis.*

Cymes sessile or short-pedunculate.

Leaves sessile, the blade decurrent to the base of the petiole......................... *H. ramonensis.*

Leaves petiolate.

Leaf blades broadest above the middle. *H. hamelioides.*

Leaf blades broadest at the middle.

Leaves short-villous beneath...... *H. asclepiadea.*

Leaves minutely puberulent beneath on the nerves. *H. inamoena.*

Corolla glabrous.

Lobes of the corolla shorter than the tube.

Leaf blades obovate or oblong-obovate, villosulous beneath along the nerves........................... *H. josefina.*

Leaf blades elliptic to lance-oblong, glabrous beneath, at least at maturity...................... *H. piratarum.*

Lobes of the corolla about as long as the tube.

Corolla 15 mm. long.......................... *H. dotae.*

Corolla 6–12 mm. long.
Leaves glabrous.................... *H. psychotriaefolia.*
Leaves villous beneath on the nerves..... *H. trichocalyx.*

Hoffmannia aeruginosa Standl., sp. nov.—Frutex metralis, caule suffrutescente subtereti crassiusculo densissime pilis intertextis brunneo-ferrugineis patentibus villoso, internodiis petiolis subaequalibus; folia opposita longipetiolata crasse membranacea, petiolo 2.5–5.5 cm. longo crassiusculo ut caule villoso; lamina elliptica vel oblongo-elliptica 11.5–19 cm. longa 4–8 cm. lata acuta vel acuminata, saepe abrupte longiacuminata, basi acuta vel interdum quoque decurrens, supra laete viridis glabra, nervis perspicuis, subtus paullo pallidior, ad costam nervosque prominentes dense breviter ferrugineo-villosa, aliter sparse puberula vel glabrata, nervis lateralibus utroque latere ca. 14 subarcuatis angulo lato divergentibus teneris; inflorescentiae axillares 3–10-florae congestiflorae cymosae vix 3 mm. longe pedunculatae vel subsessiles, ubique densissime ferrugineo- vel purpureo-villosae, floribus sessilibus vel breviter pedicellatis; hypanthium anguste obconicum 2.5–3 mm. longum, lobis lineari-triangularibus usque 2 mm. longis; corolla fere rotata, tubo brevissimo, lobis elliptico-oblongis 6 mm. longis; antherae exsertae.—Zarcero, 1,500 meters, August, 1937, *Austin Smith A86* (type in Herb. Field Mus.). Guadalupe de Zarcero, 1,525 meters, *Austin Smith H659.* "Growing in deep forest shade; gregarious but very local. Base of the stem dull, dark brown. Buds deep chokeberry red. Petioles and some of the veins of the under surface of the leaves tinged with pinkish red." This species, material of which was received when these pages were in proof, is not included in the key to species. It is easily recognized by the very abundant, rusty pubescence of the stems and flowers.

Hoffmannia affinis Hemsl. Diag. Pl. Nov. 31. 1879. Type, *Endres 150,* without locality. Known only from the original collection, and to the writer only from description. Branches terete, puberulent when young; petioles 6 mm. long, the blades ovate-oblong, 10–12.5 cm. long, obtusely acuminate, attenuate to the base, minutely puberulent beneath; flowers 6–8 mm. long, puberulent, umbellate-cymose, the cymes fasciculate, about 6-flowered, the slender peduncles 8–16 mm. long, the pedicels 2–4 mm. long; calyx lobes rounded; corolla tube slightly shorter than the lobes.

Hoffmannia amplexifolia Standl. Journ. Wash. Acad. Sci. 15: 8. 1925. Moist forest near Orosi, Prov. Cartago, *Standley 39869.* Also at Santo Domingo de Vara Blanca, 2,200 meters. Endemic.

Stems simple, herbaceous, 1–1.5 meters high, glabrous, acutely quadrangular; leaves ternate, sessile, oblanceolate or oblong-obovate, 23–35 cm. long, 8–13 cm. wide, or larger, acuminate or long-acuminate, long-attenuate to the very narrow, deeply cordate, clasping base, glabrous above, minutely puberulent beneath on the nerves; cymes many-flowered, 3–8 cm. long, lax, sessile, the flowers slender-pedicellate; calyx short-villous, the lobes narrowly triangular, obtuse; corolla greenish yellow, puberulent or villosulous, the lobes longer than the tube; fruit red.

Hoffmannia arborescens Donn. Smith, Bot. Gaz. 37: 417. 1904. In forest, Santa Rosa del Copey, 1,800 meters, *Tonduz 8121* (*12230*). Known only from the original material. A shrub or small tree, the branchlets quadrangular; petioles 3–5 mm. long; blades oblanceolate-elliptic, 15–19 cm. long, 3.5–5.5 cm. wide, acuminate, long-attenuate to the base, glabrous; cymes fasciculate, many-flowered, fuscous-pubescent, 2–3.5 cm. long, the bracts foliaceous, 1 cm. long; hypanthium and calyx pubescent, the lobes minute, deltoid; corolla 12 mm. long, pale rose, pubescent, the lobes about equaling the tube.

Hoffmannia asclepiadea Standl. Journ. Wash. Acad. Sci. 15: 7. 1925. Wet forest at Las Nubes, Prov. San José, 1,900 meters, *Standley 38349*. Forests of the slopes of Irazú, 1,900–2,300 meters. Endemic. A simple shrub or herb, 1.5 meters high, erect or ascending, the stems villosulous; leaves opposite, on stout petioles 2.5–4 cm. long, the blades elliptic or ovate-elliptic, 15–20 cm. long, 7–9 cm. wide, abruptly acuminate or long-acuminate, cuneate at the base, glabrous above, copiously short-villous beneath, especially on the nerves; cymes sessile, shorter than the petioles, many-flowered, the flowers short-pedicellate; hypanthium villosulous, the calyx lobes ovate-deltoid, obtuse, 1 mm. long; corolla greenish yellow, densely short-villous; fruit subglobose, red, sparsely short-villous.

Hoffmannia carpinterae Standl. N. Amer. Fl. 32: 199. 1934. *H. macrophylla* Standl. Journ. Wash. Acad. Sci. 15: 9. 1925, non Hemsl. Wet forest, Cerro de La Carpintera, Prov. Cartago, 1,700 meters, *Standley 35636*. Known only from the type locality. A shrub 3 meters high, with few branches, glabrous throughout; leaves sessile or nearly so, oblong-obovate, 21–35 cm. long, 8–10 cm. wide, abruptly acute, long-attenuate to the base; cymes sessile or pedunculate, 3–4 cm. long, lax, few-flowered, the pedicels 3–8 mm. long;

calyx red, the lobes rounded-deltoid, 1.5 mm. long; corolla in bud 6 mm. long, the lobes yellow within, twice as long as the tube.

Hoffmannia decurrens Standl. Contr. U. S. Nat. Herb. 20: 205. 1919. Forests of Santa Rosa del Copey, 1,800–2,000 meters, *Tonduz 12230*. Mountains of Dota, 1,650–2,000 meters. Endemic. A sparsely branched shrub of 1–2.5 meters, the branchlets rufous-villosulous or glabrate; petioles 5–30 mm. long; blades oblong-oblanceolate to narrowly elliptic, 7–20 cm. long, 2–6 cm. wide, acute or acuminate, long-attenuate to the base, glabrous above, paler beneath, villosulous along the nerves or finally glabrate; cymes axillary or at naked nodes below the leaves, usually many-flowered, sessile or short-pedunculate, the pedicels 5 mm. long or less; calyx and hypanthium rufous-villous or villosulous, the lobes triangular, 1–1.5 mm. long, obtuse; corolla white, tinged with rose, 8–9 mm. long, sparsely villosulous, the lobes obtuse, slightly shorter than the tube; fruit oval, red, 6–8 mm. long.

Hoffmannia dotae Standl. Journ. Wash. Acad. Sci. 18: 181. 1928. Moist forest near Santa María de Dota, Prov. San José, 1,700 meters, *Standley & Valerio 43277*. Region of the type locality. Endemic. An erect, branched shrub 2–4.5 meters high, the branches glabrous or sparsely villous; petioles 2 cm. long or less, the blades oblong-obovate to obovate-elliptic, 18–30 cm. long, 8–12 cm. wide, abruptly short-acuminate, narrowed toward the abruptly long-decurrent base, glabrous above, at first sparsely short-villous beneath on the nerves but soon glabrate; cymes lax, few-flowered, 5.5 cm. long or shorter, the peduncles to 3.5 cm. long, the pedicels 4–12 mm. long; hypanthium sparsely short-villous, the calyx lobes 2.5–3.5 mm. long, triangular, obtuse or acutish; corolla red below, yellow above, 15 mm. long, glabrous, or sparsely villous on the lobes, the lobes equaling the tube; fruit red, oblong, 8–9 mm. long.

Hoffmannia hamelioides Standl. Journ. Wash. Acad. Sci. 15: 8. 1925. Moist forest between Aserrí and Tarbaca, Prov. San José, 1,800 meters, *Standley 34149*. Known certainly only from the original material. A sparsely branched shrub of 1.5 meters, the branches glabrous; leaves opposite, the stout petioles 1–3 cm. long, the blades obovate-elliptic or oblanceolate-elliptic, 12–21 cm. long, 4.5–7 cm. wide, acuminate, cuneate-decurrent to the base, glabrous above, villosulous beneath on the nerves; cymes sessile, with few or many flowers, about equaling the petioles; calyx short-villous, the lobes narrowly triangular, 1–1.5 mm. long; corolla in bud 4 mm.

long, greenish white, short-villous; fruit dark red, subglobose, 7–8 mm. long.

Hoffmannia inamoena Standl. Journ. Wash. Acad. Sci. 18: 179. 1928. Wet forest, Los Ayotes, near Tilarán, Guanacaste, 600 meters, *Standley & Valerio 45421.* Mountain forests of Guanacaste. Endemic. A simple, erect shrub of 1–1.5 meters, the stems terete, at first minutely puberulent; leaves opposite, the petioles 1–4.5 cm. long, the blades mostly elliptic, 8–20 cm. long, 3.5–10 cm. wide, abruptly acute or acuminate, obtuse to rounded and abruptly long-decurrent at the base, glabrous above, densely and minutely puberulent beneath on the nerves, or even over the whole surface; flowers fasciculate in the leaf axils, or in sessile or short-pedunculate, few-flowered cymes, the pedicels 4 mm. long or less; calyx lobes triangular-oblong, 1–2 mm. long, obtuse, short-villous; fruit subglobose, 6–7 mm. long, white, villous.

Hamelia josefina Standl. Journ. Wash. Acad. Sci. 15: 8. 1925. Moist forest between Aserrí and Tarbaca, Prov. San José, 1,800 meters, *Standley 34143.* Also in the region of Dota. Endemic. A sparsely branched shrub 3 meters high, the branches terete, glabrous; petioles 1–1.5 cm. long, the blades obovate or oblong-obovate, 13–22 cm. long, 5.5–9 cm. wide, acute or abruptly short-acuminate, cuneate-attenuate to the base, glabrous; cymes with few or many flowers, pedunculate, longer than the petioles, the branches glabrous, the pedicels 1–3 mm. long; calyx glabrous or with a few short, scattered hairs, the lobes 2 mm. long, narrowly triangular, acute; corolla 11 mm. long, glabrous, the lobes shorter than the tube; fruit subglobose, 6 mm. long, dark red.

Hamelia latifolia (Bartl.) Kuntze has been reported from Costa Rica, but doubtless in error, the species being a Peruvian one.

Hoffmannia leucocarpa Standl. Journ. Wash. Acad. Sci. 15: 9. 1925. Wet forest, Las Nubes, Prov. San José, 1,600 meters, *Standley 38340.* Forests of the mountains of the central region; Zarcero; at 1,300–2,400 meters. Endemic. A simple or branched shrub, 2.5 meters high or less, glabrous throughout; leaves opposite, the petioles 3–6.5 cm. long, the blades elliptic or lance-elliptic, 15–25 cm. long, 6–12 cm. wide, rather abruptly acuminate, acute or cuneate at the base; cymes equaling or often exceeding the petioles, lax, with few or many flowers, the branches bright red, the pedicels 5–12 mm. long; calyx red, 2–3 mm. long, the lobes deltoid, acute;

corolla yellow and red, 7 mm. long, glabrous, the lobes longer than the tube; fruit subglobose, 1 cm. long, white.

Hoffmannia longepetiolata Polak. Linnaea 41: 567. 1877. Forests of La Carpintera, *Polakowsky 134* (photo. of type in Herb. Field Mus.). Mountain forests of the central region, at 1,600–2,200 meters. Endemic. A slender, glabrous shrub, the branches subterete; leaves opposite, the petioles 2–4 cm. long, the blades obovate or obovate-oblong, 10–19 cm. long, 3–7 cm. wide, abruptly acuminate, long-cuneate or attenuate to the base; cymes 3–8-flowered, sessile, much shorter than the petioles, the flowers slender-pedicellate or subsessile; calyx lobes minute, obtuse; corolla yellow, almost 1 cm. long, the lobes obtuse, much longer than the tube; fruit subglobose. Var. *minor* Polak. op. cit. 568 may be a form of this, but it is more likely to be a distinct species. I have seen no material of the variety.

Hoffmannia nesiota Donn. Smith, Bot. Gaz. 61: 374. 1916. Wafer Bay, Cocos Island, *Pittier 12387*. Branchlets subterete, glabrous; leaves opposite, the stout petioles 8 cm. long, the blades broadly elliptic, 22–26 cm. long, 11 cm. wide, acuminate at each end, glabrous; cymes with few or many flowers, lax, the peduncles mostly 3.5–5 cm. long, the pedicels 6–10 mm. long; calyx lobes narrowly triangular, 1.5–2 mm. long, acute; corolla 11 mm. long, puberulent, the linear lobes acute, about equaling the tube; fruit oval, 1 cm. long, 3-celled.

Hoffmannia pallidiflora Standl. Journ. Wash. Acad. Sci. 15: 9. 1925. Wet forest, La Hondura, Prov. San José, 1,500 meters, *Standley 37877*. Mountain forests of the central region, 1,400–1,500 meters. Endemic. A simple shrub 1–2 meters high, the stems obtusely tetragonous, glabrous; leaves opposite, the slender petioles 2–4 cm. long, the blades elliptic or elliptic-obovate, 15–25 cm. long, 7–9 cm. wide, abruptly acuminate, abruptly decurrent at the base, glabrous; cymes few-flowered, long-pedunculate, often at naked nodes below the leaves, equaling the petioles, the branches glabrous, the flowers partly sessile and partly slender-pedicellate; calyx pale green, the lobes triangular, obtuse or acute, 1–1.5 mm. long; corolla pale green, 8 mm. long, the lobes almost twice as long as the tube; fruit oval, red, 1 cm. long.

Hoffmannia piratarum Standl. Journ. Wash. Acad. Sci. 18: 180. 1928. Wafer Bay, Cocos Island, *Pittier 16259*. Known only from the original collection. Branchlets obtusely tetragonous, glabrous; leaves opposite, the slender petioles 2.5–4.5 cm. long, the blades lance-oblong, 10–20 cm. long, 5–6 cm. wide, long-acuminate, glabrous above, sparsely short-villous beneath when young but soon glabrate; cymes solitary or fasciculate, dense, few-flowered, 3 cm. long or shorter, the peduncles 2.5 cm. long or less, the pedicels 2–5 mm. long; hypanthium glabrous or sparsely short-villous; calyx lobes triangular-oblong, 2–3 mm. long, acute, villous-ciliate; corolla 1 cm. long, glabrous or with a few short hairs at the apex, the lobes slightly shorter than the tube; fruit subglobose, 2-celled, 6 mm. long, glabrous.

Hoffmannia psychotriaefolia (Benth.) Griseb. Fl. Brit. W. Ind. 321. 1861. *Higginsia psychotriaefolia* Benth. in Oerst. Vid. Medd. Kjoebenhavn 50. 1852. Volcán de Barba, 1,800 meters, *Oersted* (photo. of type in Herb. Field Mus.). Frequent in wet forest of the central mountains; region of San Ramón; at 1,000–1,600 meters. Panama to Guatemala. A shrub 1–2.5 meters high, glabrous throughout, usually branched, the branches subterete; leaves opposite, the slender petioles 1–4 cm. long, the blades elliptic-oblong or elliptic, 7–15 cm. long, 2.5–5 cm. wide, cuspidate-attenuate, acute or attenuate at the base, bright green above, pale yellowish green beneath; cymes sessile, few-flowered, equaling or shorter than the petioles, the flowers short-pedicellate; calyx 1.5–2 mm. long, the lobes minute, deltoid; corolla yellow, sometimes tinged with red, 10–11 mm. long, the lobes acute, about equaling the tube; fruit red.

Hoffmannia ramonensis Standl. Journ. Wash. Acad. Sci. 18: 180. 1928. Along the Río Barranca at San Juan, near San Ramón, 1,300–1,400 meters, *Tonduz 17812*. Region of Zarcero, 1,260–1,500 meters. Endemic. A shrub or small tree, sometimes 6 meters high, with a trunk as much as 12 cm. in diameter, the branches terete, glabrous or nearly so; leaves opposite, sessile or almost so, obovate-oblong, 14–28 cm. long, 6–10 cm. wide, acute or abruptly short-acuminate, gradually narrowed below the middle then rather abruptly long-attenuate into a petioliform portion 3–6 cm. long, glabrous above, densely tomentose beneath when very young but in age glabrate except along the nerves; cymes solitary or fasciculate, umbelliform, mostly 2–5-flowered, the peduncles 6–15 mm. long, the pedicels 2–4 mm. long, densely villous-tomentose; hypanthium 2.5–3 mm. long, brown-tomentose, the calyx lobes narrowly triangular, 1.5–2 mm. long, narrowed to an obtuse apex; corolla in bud 6–7 mm. long, villous-tomentose, yellow; fruit dark crimson.

Hoffmannia refulgens (Hook.) Hemsl. Mountains of Guanacaste; region of San Ramón; at 600–900 meters, growing in deep, wet forest; Atlantic tierra caliente. Ranging to southern Mexico. Plants simple, herbaceous or suffrutescent, usually less than 40 cm. high, the stems ferruginous-villous or glabrate, densely leafy above; leaves opposite, the stout petioles 3.5 cm. long or less, the blades obovate to oblong-oblanceolate, 9–25 cm. long, 4–11 cm. wide, rounded or obtuse at the apex and abruptly apiculate, acute to long-attenuate at the base, glabrous or sparsely villous above, often purple or reddish beneath, ferruginous-villous, at least on the nerves, or finally glabrate; flowers subumbellate or subracemose, sometimes secund, short-pedicellate, the slender peduncles 2.5–12 cm. long; calyx and hypanthium 3–4 mm. long, the hypanthium glabrous, the calyx lobes 2 mm. long or less, acute, sparsely villosulous; corolla red or pale red, 1 cm. long, glabrous, the lobes 2–3 times as long as the tube; fruit bright red. The plant, although small, is rather handsome because of its red flowers and fruits. It has been introduced into cultivation in Europe. It grows usually in the deepest, darkest forest.

Hoffmannia subauriculata Standl. Journ. Wash. Acad. Sci. 18: 179. 1928. Moist forest, El Muñeco, Río Navarro, Prov. Cartago, 1,400 meters, *Standley & Torres 50956*. Known only from the type region. Endemic. A slender, decumbent shrub 1–1.5 meters long, the branchlets obtusely quadrangular, glabrous; leaves opposite, sessile, elliptic-obovate, 15–22 cm. long, 7–9.5 cm. wide, abruptly short-acuminate, abruptly narrowed near the base into a petioliform portion about 2 cm. long, the very base rounded to cordate and amplexicaul, glabrous; cymes at naked nodes below the leaves, many-flowered, on slender peduncles 6–9 cm. long, the slender pedicels 6–12 mm. long; fruit oval or globose, bright red, glabrous, 8 mm. long; calyx lobes deltoid, subacute, 1 mm. long.

Hoffmannia Tonduzii Standl. Contr. U. S. Nat. Herb. 20: 205. 1919. Forests of Las Vueltas, Tucurrique, 700 meters, *Tonduz 13373*. Frequent in mountains of the central region, at 1,800 meters or less, descending to the upper part of the Atlantic tierra caliente; regions of Dota and San Ramón; said to be sometimes epiphytic. Endemic. A slender, usually branched shrub, 1–2 meters high, the branchlets green, terete, glabrous; leaves short-petiolate, mostly obovate-elliptic or oblong-oblanceolate, 5–12 cm. long, 1.5–5.5 cm. wide, acute to cuspidate-acuminate, acute to long-decurrent at the base, glabrous; cymes sessile or subsessile, few-flowered, usually shorter than the petioles, the pedicels 5 mm. long or less; calyx lobes narrowly triangular, 1–1.5 mm. long, acute; corolla 6–7 mm. long, glabrous, yellow, the lobes acute, twice as long as the tube; fruit dark cherry-red, subglobose, 1 cm. long.

Hoffmannia trichocalyx Standl. Journ. Wash. Acad. Sci. 18: 181. 1928. Wet forest, Fraijanes, Prov. Alajuela, 1,600 meters, *Standley & Torres 47690*. Known only from the type region. Endemic. A large, weak shrub, 1–2.5 meters long, often decumbent, the stout branches terete, the young branchlets sparsely villous or glabrous; leaves opposite, the slender petioles 1.5–7 cm. long, the blades elliptic to oblong-elliptic, 12–26 cm. long, 5–10 cm. wide, abruptly acuminate, cuneate to obtuse at the base, usually abruptly contracted and short-decurrent, glabrous above, usually villous beneath along the nerves; cymes pendent from naked nodes below the leaves, fasciculate, 3–14 cm. long, with few or many flowers, the long, slender peduncles usually villous, dark red, the pedicels 3–6 mm. long; calyx lobes broadly deltoid, subacute, 2 mm. long, villous; corolla 1 cm. long, bright yellow or red and yellow, glabrous or sparsely villous, the lobes about equaling the tube; fruit oval, 8 mm. long, dark red, glabrous or sparsely villous.

Hoffmannia Valerii Standl. Journ. Wash. Acad. Sci. 18: 178. 1928. El Arenal, Guanacaste, 600 meters, *Juvenal Valerio 57*. Mountain forests of Guanacaste, 600–700 meters. Endemic. A branched shrub 1–1.5 meters high, the branches subterete, densely villous when young; leaves opposite, the slender petioles 1–2 cm. long, the blades elliptic or ovate-elliptic, 7–11 cm. long, 3.5–5.5 cm. wide, acute or acuminate, obtuse or rounded at the base and abruptly decurrent, sparsely villous above when young but soon glabrate, villous beneath along the nerves; cymes few-flowered, dense, fasciculate, sessile or nearly so, the peduncles in fruit sometimes 1 cm. long, the pedicels 2–5 mm. long, glabrous or nearly so; hypanthium glabrous or with a few short hairs, the calyx lobes narrowly triangular, 1 mm. long, acute or obtuse; corolla in bud 5–6 mm. long, short-villous, the lobes obtuse, 3 times as long as the tube; fruit subglobose, 6 mm. long, bright red, glabrous.

HOLTONIA Standl.

Trees, almost glabrous; leaves opposite, thick-membranaceous, petiolate; stipules resiniferous, persistent, connate to form a truncate or shallowly bilobate sheath; inflorescence terminal, many-flowered, paniculate, the flowers small, 5-parted; calyx cupular, shallowly and remotely denticulate; corolla white, tubular-campanulate, glabrous outside, barbate within at the insertion of the stamens, the short lobes broadly triangular, obtuse, valvate or subimbricate, one-third as long as the tube; anthers exserted; capsule small, subglobose, loculicidally bivalvate; seeds numerous, minute, angulate.—The genus consists of a single species.

Holtonia myriantha Standl. *Sickingia myriantha* Standl. El General, 975 meters, *Skutch 2387*. Colombia. A tree 23 meters high, the trunk 28 cm. in diameter; branchlets glabrous; petioles 1–3 cm. long, the blades obovate to oblong-elliptic, 8–20 cm. long, 4–8 cm. wide, abruptly short-acuminate, acute or attenuate at the base, densely short-barbate beneath in the axils of the nerves, otherwise glabrous; panicles 10–20 cm. long and broad, the branches sparsely and minutely puberulent, the flowers sessile; calyx 0.5 mm. long; corolla 4 mm. long, 3.5 mm. wide; capsule 2–2.5 mm. long.

ISERTIA Schreb.

Trees or shrubs, pubescent or glabrous, the branchlets terete; leaves opposite or ternate, petiolate; stipules 2 between each 2 leaves, narrow, erect, persistent; flowers usually large, short-pedicellate, mostly red and yellow, cymose-corymbose or cymose-paniculate; hypanthium subglobose or ovoid; calyx short, 4–6-dentate or truncate, persistent; corolla tubular-funnelform or salverform, coriaceous, barbate in the throat, the limb 4–6-lobate, the lobes short, valvate; ovary 4–6-celled, many-ovulate; fruit small, baccate, globose or ovoid, 4–6-pyrenate; seeds minute, subglobose, foveolate.—One other Central American species occurs in Panama.

Isertia Haenkeana DC. *I. Deamii* Bartlett, var. *stenophylla* Donn. Smith, Bot. Gaz. 61: 374. 1916 (plains near Boca Culebra, Prov. Puntarenas, 50 meters, *Pittier 11989*). Thickets of the Pacific coast; while I have seen no specimens from the Atlantic tierra caliente of Costa Rica, the species doubtless occurs there also, for it is common along the coast both north and south of Costa Rica. Guatemala to Colombia; Cuba. A shrub 2–3 meters high, the branches densely sericeous; stipules 6–12 mm. long; petioles stout, 2.5 cm. long or less, the blades obovate to oblong-obovate, 20–45 cm. long, 8–18 cm. wide, abruptly acuminate, acute or attenuate at the base, green and glabrate above, densely grayish-pilose and pale beneath; inflorescence usually thyrsiform, 7–20 cm. long, dense and many-flowered; corolla

17–35 mm. long, yellow or orange-red, sparsely or densely puberulent or tomentulose; fruit purple, depressed-globose, 5–6 mm. broad.

IXORA L.

Trees or shrubs, glabrous or pubescent, the branchlets terete or angulate; leaves opposite or rarely ternate, sessile or petiolate, usually coriaceous; stipules mostly acuminate from a broad base, persistent or deciduous; flowers in terminal or axillary corymbs, variously colored; calyx short, usually 5-lobate, persistent, the lobes short or elongate; corolla salverform, the throat glabrous or pilose, the lobes usually short, spreading, contorted; anthers wholly or partially exserted; ovary 2-celled, the cells 1-ovulate, the ovules peltately attached to the middle of the septum; fruit baccate, the 2 carpels concavo-convex.—No other species are known from Central America.

Ixora coccinea L. *Jazmín.* Planted commonly for ornament. Native of India. A small, dense shrub, glabrous or nearly so; leaves sessile, broadly oblong to suborbicular, obtuse or rounded at the apex, generally cordate at the base; inflorescence dense and headlike, the flowers sessile or nearly so; calyx lobes broadly ovate, obtuse or acutish; corolla deep red, minutely puberulent or glabrate, the filiform tube 2.5–3 cm. long, the spreading lobes acute.

Ixora Finlaysoniana Wallich. *Corona de la reina.* Grown commonly as an ornamental shrub. Native of Siam. A dense shrub of 1–2 meters, glabrous or nearly so; leaves short-petiolate, oblong or oblanceolate-oblong, obtuse or acute, attenuate to the base; inflorescence dense and headlike, many-flowered; corolla white, the filiform tube about 3.5 cm. long, the obtuse lobes 6–7 mm. long.

Ixora floribunda (A. Rich.) Griseb. *Palo de María.* Monte Aguacate, *Friedrichsthal 1288.* Extending to Salvador; Cuba; Colombia. A shrub or tree, sometimes 9 meters high; petioles 1–2.5 cm. long, the blades elliptic to elliptic-oblong, 11–25 cm. long, 4–11 cm. wide, acute or short-acuminate, attenuate to subacute at the base, glabrous; inflorescence cymose-paniculate, short-pedunculate or sessile, 4–10 cm. broad, the branches densely pilose, the flowers sessile or short-pedicellate; calyx shallowly lobate; corolla white, glabrous, 6–10 mm. long, the lobes about equaling the tube; fruit globose, short-pilose, 4 mm. or more in diameter.

Ixora nicaraguensis Standl. *I. rauwolfioides* Standl. Forests of the Atlantic tierra caliente. Panama to British Honduras. A shrub or tree, 2.5–7.5 meters high, the trunk sometimes 12 cm. in diameter; petioles 4–10 mm. long; blades elliptic-oblong or lance-oblong, 7–15 cm. long, 2–5.5 cm. wide, acute or short-acuminate, acute or acuminate at the base, glabrous; inflorescence cymose-paniculate, sessile or pedunculate, 5–9 cm. long, the branches minutely puberulent, the pedicels 5 mm. long or less; calyx truncate or nearly so; corolla white, glabrous, the tube 5 mm. long, the lobes 3–4 mm. long, rounded at the apex.

LADENBERGIA Klotzsch

Trees or shrubs; leaves mostly opposite, petiolate, coriaceous; stipules deciduous; flowers small or medium-sized, white or pink, in terminal panicles; hypanthium ovoid or turbinate, pubescent, the calyx cupular, 5-lobate, persistent or deciduous; corolla salverform, pubescent, the lobes valvate, papillose within and on the margins; ovary 2-celled, many-ovulate; capsule oblong or cylindric, septicidally bivalvate from the apex to the base; seeds numerous, imbricate, broadly winged.—The other members of the genus are South American.

Ladenbergia Brenesii Standl., sp. nov.—*Quina, Agujilla.* Arbor 5–10-metralis, ramulis crassis obtuse tetragonis ochraceis glabris; stipulae ovales 2–3 cm. longae obtusae coriaceae glabrae vel extus sparse minute strigillosae; folia magna coriacea, petiolo crasso glabro 1–3.5 cm. longo; lamina oblonga usque oblongo-elliptica vel elliptico-obovata plerumque 10–25 cm. longa atque 5–10 cm. lata, obtusa vel subacuta, basi late rotundata usque subacuta, supra lucida glabra saltem in stato adulto glaberrima, costa elevata, nervis lateralibus utroque latere ca. 10 prominentibus obliquis; inflorescentia cymoso-paniculata dense multiflora, basi trichotoma, crasse pedunculata, ca. 11 cm. longa, ramis crassis dense sericeis, floribus sessilibus vel brevissime pedicellatis; hypanthium clavatum 4–6 mm. longum densissime pilis brunnescentibus subadpressis indutum; calyx 2 mm. longus, lobis late ovalibus apice rotundatis extus dense adpresso-pilosis; corolla extus dense fulvo-sericea, tubo 2 cm. longo sursum sensim dilatato atque 5–6 mm. lato, lobis lanceolato-oblongis 8 mm. longis acutis vel acutiusculis intus dense minute papillosis; capsula 2–4.5 cm. longa, valvis ca. 1 cm. latis.—San Ramón, March, 1932, *Brenes 15146* (type in Herb. Field Mus.). Los Angeles y La Paz de San Ramón, March, 1928, *Brenes 6094.* Alto de La Palma de San Ramón, 1,150 meters, February, 1923, *Brenes 3837.* La Palma de San Ramón, 1,250 meters, July, 1927, *Brenes 5591.* Alto de La Estrella, Prov. Cartago, *Standley 39298.* La Palma, Prov. San José,

1,460 meters, *Tonduz 12647* (*J. D. Smith 7397*). In the *North American Flora* (32: 95. 1921) I referred this tree incorrectly to *L. undata* Klotzsch, a species of Colombia and Venezuela, chiefly because at that time adequate South American material was not available for study. Comparison with authentic material of that species shows that the Costa Rican tree is altogether distinct, nor does it agree better with any other Colombian species of *Ladenbergia*.

Ladenbergia sericophylla Standl., sp. nov.—Arbor usque 36 m. alta, trunco 55 cm. diam., ramulis breviter pilosis vel glabratis; stipulae late oblongae 3.5 cm. longae obtusae extus sparse adpresso-pilosae; folia magna papyracea, petiolo usque 6 cm. longo glabrato; lamina elliptica vel late elliptica, 30 cm. longa atque 17 cm. lata vel minor, breviter acutata vel apice subrotundata, basi obtusa vel subrotundata atque subito breviter decurrens, supra lucida glabra, subtus in statu juvenili ubique minute subsparse strigillosa, ad nervos venasque densissime fulvo-sericea, in statu adulto glabrata, costa crassa, nervis lateralibus utroque latere ca. 10 angulo recto vel paullo latiore adscendentibus; inflorescentia perfecta non visa; hypanthium clavatum 7 mm. longum dense brunneo-sericeum; calyx 6–7 mm. longus late campanulatus ferrugineus prope basin sericeus, superne fere glaber, ad tertiam partem lobatus, lobis semiorbicularibus subrecurvis; corolla extus subdense fulvo-strigosa, tubo crasso 3 cm. longo subtereti, fauce 6 mm. lato.—Two miles southeast of San Isidro del General, August, 1936, *Ralph E. Danforth 32* (type in Herb. Field Mus.). El General, 880 meters, January, 1936, *A. F. Skutch 2539* (detached flowers and tracing of a leaf, from U. S. Nat. Herb.). I once determined these two collections as *L. calycina* (Wedd.) Standl., a species of Colombia. While the Costa Rican and Colombian trees are related, because of the form of the calyx, more careful study shows that they are specifically distinct. The flowers are described by the collectors as white, pinkish, or yellowish white, and very fragrant. Mr. Danforth reports that the leaves are as much as 35 cm. long and 12 cm. wide, the lateral nerves being depressed so that the leaf, when fresh, appears to be slightly fluted.

Ladenbergia Valerii Standl., sp. nov.—Arbuscula 3–5-metralis, ramis elongatis, ramulis teretibus cinereo-brunnescentibus striatis, novellis glabris; stipulae subcoriaceae ca. 1.5 cm. longae ovali-ovatae obtusae ferrugineae glabrae; folia breviter petiolata coriacea modica, petiolo crasso 1–2 cm. longo glabro; lamina elliptica vel anguste elliptica 12–15 cm. longa 5–7.5 cm. lata breviter acuminata, basi acuta, supra in sicco fusca lucida glabra, costa nervisque subsulcatis, subtus brunnescens sparse secus costam nervosque hirtella, aliter glabra vel glabrata, costa crassiuscula elevata, nervis lateralibus utroque latere ca. 11 angulo latiusculo adscendentibus subarcuatis teneris prominentibus; paniculae parvae dense pauciflorae breviter pedunculatae, corollis exclusis vix 6 cm. longae, ramis crassis sparse strigosis, floribus sessilibus vel breviter pedicellatis; hypanthium anguste turbinatum 4–5 mm. longum dense fulvo-sericeum; calyx fere ad basin lobatus glaber vel glabratus, lobis 5–6 mm. longis late ovalibus apice rotundatis plus minusve recurvis; corolla extus dense adpresse fulvo-pilosa, tubo 2 cm. longo sursum sensim dilatato, fauce 5 mm. lato, lobis 1 cm. longis lineari-lanceolatis acutis, intus dense minute papillosis.—In forest, La Paz de San Ramón, 1,225 meters, June, 1925, *Brenes 4296* (type in Herb. Field Mus.). The species is dedicated to Professor Juvenal Valerio Rodríguez, Director of the Museo Nacional de Costa Rica. While related to *L. sericophylla,* it is, I believe, sufficiently distinct in characters of pubescence and inflorescence.

LINDENIA Benth.

Shrubs, the branches terete; petioles short, connate, cuspidate, more or less persistent; leaves short-petiolate, narrow; flowers large and showy, white, short-pedicellate, in few-flowered, terminal cymes; hypanthium elongate-turbinate, 5-costate, the calyx 5-lobate, the lobes elongate-subulate or lanceolate, persistent; corolla salverform, the tube greatly elongate, the throat naked, the 5 lobes oblong, spreading, contorted in bud; anthers exserted; ovary 2-celled, many-ovulate; capsule clavate or pyriform, septicidally bivalvate, the valves bifid, often coiled after dehiscence; seeds small, angulate, smooth.—The genus consists of a single species.

Lindenia rivalis Benth. *Lirio.* Along streams, usually on rocks at the edge of water, region of Tilarán, Guanacaste, and probably elsewhere. Panama to southern Mexico. A stout, simple or sparsely branched shrub, usually less than a meter high; leaves short-petiolate, oblanceolate to linear-elliptic, 5–15 cm. long, 1–2.5 cm. wide, acute or attenuate at each end, puberulent or pilosulous or almost glabrous; cymes mostly 3-flowered; calyx lobes 1–2 cm. long, green; corolla tube usually 10–16 cm. long, pilosulous, the lobes 2.5–3 cm. long; capsule 1–2 cm. long. The plant is a conspicuous and showy one when in blossom.

MACHAONIA Humb. & Bonpl.

Shrubs or small trees, glabrous or pubescent, the branches terete, often spinose; leaves opposite or ternate, petiolate or sessile; stipules small, deltoid, acute or acuminate; flowers small, white, the inflorescence terminal; hypanthium turbinate, compressed; calyx 4–5-lobate, the lobes persistent; corolla short-funnelform, the tube short, villous in the throat, the 4–5 lobes rounded, imbricate; ovary 2-celled, the cells 1-ovulate; fruit small, dry, laterally compressed, dicoccous, the cocci indehiscent.—Two other species are known from Central America, and one of them, *M. acuminata* Humb. & Bonpl., with pubescent leaves, is to be expected in Costa Rica.

Machaonia rotundata Griseb. Thickets of the Atlantic coast. Panama and Jamaica. A shrub of 3 meters or less; stipules 3–4 mm. long; petioles 3–10 mm. long, the blades oval to broadly ovate, 5–9 cm. long, 2–5.5 cm. wide, abruptly short-acuminate, rounded or obtuse at the base, glabrous, sometimes obscurely barbate beneath in the axils of the nerves; panicles pyramidal or rounded, 6–13 cm. broad, the flowers densely glomerate; calyx and hypanthium 3 mm. long, glabrous or sparsely puberulent, the calyx lobes oval-oblong to suborbicular, rounded at the apex, ciliate; corolla 4–5 mm. long, glabrous outside; fruit cuneate-oblong, 4.5–6 mm. long.

Machaonia rotundata var. **Dodgei** Standl., var. nov.—Petiolus gracilis 7–8 mm. longus; lamina glabra elliptica vel elliptico-oblonga 4.5–6 cm. longa 2–2.8 cm. lata, apice obtusa vel rotundata atque emarginata, interdum acuta vel acuminata, basi acuminata.—Beach between Río Sándalo and Río Tigre, May, 1930, *C. W. Dodge 7752* (type in Herb. Field Mus.; dupl. in herb. Mo. Bot. Gard.). Noteworthy for the small leaves, acuminate at the base and often emarginate at the apex. At first I was inclined to regard it as a new species, but the flowers appear to be identical with those of *M. rotundata*, and the plant is probably better treated as a variety, for the present at least.

MACROCNEMUM P. Br.

Trees or shrubs, glabrous or pubescent, the branches terete; stipules oblong or obovate, deciduous; leaves opposite, petiolate; flowers small or medium-sized, white or pink, in terminal or axillary panicles; calyx cupular, 5-dentate, persistent; corolla funnelform or salverform, the tube elongate, the 5 lobes spreading, puberulent within, valvate or reduplicate; anthers included; ovary 2-celled, many-ovulate; capsule oblong or subcylindric, bisulcate, loculicidally bivalvate; seeds numerous, minute, compressed, winged.—One other species grows in Central America, in Panama.

Macrocnemum glabrescens (Benth.) Wedd. Ann. Sci. Nat. IV. 1: 76. 1854. *Palo cuadrado. Lasionema glabrescens* Benth. Bot. Voy. Sulph. 105. 1845. Nicoya, *Barclay.* Thickets of the Pacific coast. Ranging to Colombia. A tree of 10–15 meters; stipules 1–2 cm. long; petioles 5–15 mm. long; blades obovate or obovate-elliptic, 7–20 cm. long, 3–8 cm. wide, acute or short-acuminate, rarely rounded, cuneate or attenuate at the base, glabrous above, sparsely strigose beneath or almost glabrous, usually sparsely barbate in the axils of the nerves; inflorescence 6–20 cm. broad, pedunculate, the flowers sessile or short-pedicellate; calyx teeth minute, acute; corolla pink, glabrous outside, the tube 4–10 mm. long, the rounded lobes 4 mm. long.

MANETTIA Mutis

Plants scandent, herbaceous or suffrutescent, glabrous or pubescent; stipules short, broad, persistent; leaves opposite, small, petiolate; flowers small or large, solitary and axillary or in cymes or panicles, white, red, or yellow; calyx usually 4-lobate, persistent, the lobes short or elongate, broad or narrow, often alternating with minute teeth or large lobes; corolla tubular or funnelform, the tube short or elongate, the limb 4-lobate, the lobes usually short, erect or recurved, valvate; anthers exserted or included; ovary 2-celled, many-ovulate; capsule obovoid or turbinate, septicidally bivalvate from the apex; seeds compressed, winged.—One other species has been described from Central America.

Manettia barbata Oerst. Vid. Medd. Kjoebenhavn 47. 1852. *Lygistum barbatum* Kuntze, Rev. Gen. 287. 1891. *M. stenophylla* Donn. Smith, Bot. Gaz. 56: 58. 1913 (in thickets, Las Vueltas, Tucurrique, 635 meters, *Tonduz 12969*). Monte Aguacate, 600 meters, *Oersted* (photo. of type in Herb. Field Mus.). Occasional in thickets, ascending to 2,450 meters in the region of Dota; region of San Ramón. Endemic. Stems glabrous; leaves short-petiolate, lance-linear to lanceolate, 3–5 cm. long, narrowly long-acuminate, acute at the base, glabrous, the lateral nerves obscure; calyx lobes 4, oblong-ovate, 2 mm. long; corolla white, 5–6 mm. long, glabrous outside, the lobes barbate within; capsule 4.5 mm. long.

Manettia coccinea (Aubl.) Willd. *M. costaricensis* Wernham, Gen. Manettia 38. 1919 (*Endres 2,* without locality). Thickets of the Atlantic tierra caliente, at 900 meters or less; Guanacaste; region of San Ramón, 1,100 meters. Southern Mexico to West Indies and Guianas. Stems glabrous or short-pilose; leaves lanceolate to ovate, 3–10 cm. long, conspicuously nerved, acute or acuminate, acute or obtuse at the base, glabrous or scaberulous above, short-pilose or glabrous beneath; calyx lobes 8, linear or oblanceolate, 5–14 mm. long, recurved; corolla 17–28 mm. long, pink or dull red, more or less pilose outside; capsule 6–10 mm. long.

Manettia flexilis Brandegee. *M. estrellae* Standl. Journ. Wash. Acad. Sci. 15: 6. 1925 (wet forest, La Estrella, Prov. Cartago, *Standley 39224*). Forests south of Cartago, 1,500 meters; region of San Ramón, about 1,100 meters. Extending to Mexico, and reported from Ecuador. Stems puberulent or villosulous; leaves ovate to lance-ovate, 3–7 cm. long, acute to long-attenuate, acute or obtuse at the base, glabrous to villosulous above, short-pilose or villosulous beneath; calyx lobes 4, linear to lance-ovate, 1.5–4 mm. long, acute, recurved; corolla rose-colored, glabrous or sparsely pilose, the tube 6–7 mm. long, the lobes of equal or less length; capsule 5–7 mm. long. While I have not seen recently the type material of *M. estrellae*, examination of a photograph of the type and study of the description lead to the conclusion that it is too close to *M. flexilis* to merit specific rank.

MITRACARPUS Zucc.

Annual or perennial herbs; stipules united with the petioles to form a setiferous sheath; leaves opposite, usually narrow; flowers small or minute, 4-parted, in terminal or axillary heads; sepals unequal, connate below; corolla funnelform, the lobes valvate; stamens included or subexserted; fruit 2-celled, the cells 1-seeded, transversely or obliquely circumscissile.—At least one other species is known from northern Central America.

Mitracarpus hirtus (L.) DC. In thickets or waste ground, Meseta Central to the coasts, 1,300 meters or less. Generally distributed in tropical America. A low annual, usually less than 50 cm. high, simple or sparsely branched, the branches puberulent or villous; leaves subsessile, lanceolate to ovate-oblong, acute, 2–5 cm. long; flowers densely clustered in the leaf axils and at the ends of the branches; corolla white, 1–2 mm. long; capsule subglobose, bisulcate, short-pilose, scarcely 1 mm. long.

The genus *Morinda* probably is represented in the tierra caliente, but I have seen no Costa Rican specimens.

NOTHOPHLEBIA Standl.

Trees, the branchlets thick, subterete; leaves large, opposite, petiolate, subcoriaceous, finely striate-lineolate between the veins;

stipules large, elongate; flowers large, sessile or pedicellate, the inflorescence axillary, cymose-corymbose, many-flowered, pedunculate; hypanthium turbinate, the calyx campanulate, subtruncate, irregularly and very shallowly undulate-lobate, persistent; corolla funnelform, coriaceous, the throat glabrous, the 5 lobes short, valvate; anthers included; ovary 2-celled, many-ovulate; fruit not seen but doubtless baccate.—The genus consists of a single species, which should perhaps be referred to *Pentagonia*.

Nothophlebia costaricensis Standl. Contr. U. S. Nat. Herb. 17: 438. 1914. Hills of Moin, Atlantic tierra caliente, *Pittier 16024*. Known only from the original collection. A tree with a depressed crown, the branchlets minutely sericeous or glabrate; stipules lance-oblong, 3.5–4 cm. long, attenuate, sparsely sericeous outside, glabrous within; petioles 4–5.5 cm. long, the blades oval, 33 cm. long, 17 cm. wide, very obtuse, rounded and short-decurrent at the base, glabrous above, minutely sericeous beneath along the veins or glabrate, the lateral nerves about 12 on each side; inflorescence many-flowered, lax, short-pedunculate, the stout pedicels 7 mm. long or less; hypanthium 4–5 mm. long, sericeous; calyx 4–5 mm. long and broad, sparsely and minutely sericeous outside; corolla puberulent, the tube 2 cm. long, gradually dilated from the base to the apex, the lobes 4–5 mm. long.

OLDENLANDIA L.

Annual or perennial herbs, glabrous or pubescent; leaves opposite, sessile or petiolate, usually very small; stipules small, acute or acuminate, sometimes setiferous; flowers in dichotomous, axillary and terminal panicles or cymes, or sometimes solitary; calyx 4-parted, the lobes usually erect and remote in fruit; corolla rotate or funnelform, the tube short or elongate, the lobes obtuse, valvate; anthers commonly exserted; ovary 2-celled, many-ovulate; capsule small, globose or turbinate, loculicidally dehiscent at the apex or for the whole length; seeds few, angulate or subglobose, smooth or minutely granulate.—One other species occurs in northern Central America.

Oldenlandia corymbosa L. Reported from Costa Rica, probably in the Atlantic tierra caliente. Widely distributed in tropical regions of both hemispheres. Annual, erect or decumbent, glabrous except on the leaves, usually much branched; stipules with 1 or more long setae; leaves sessile or subsessile, linear or linear-lanceolate, 1–3.5 cm. long, acute, 1-nerved, usually scaberulous above; flowers in small, axillary cymes, the slender pedicels filiform; corolla white, equaling or slightly exceeding the calyx lobes; capsule subglobose, 1.5–2 mm. broad.

Oldenlandia herbacea (L.) DC. Atlantic tierra caliente, in waste ground; pastures near San José. Widely distributed in the tropics of both hemispheres. Annual, erect or procumbent, glabrous; leaves sessile, usually linear, mostly 2–5 cm. long; flowers axillary, usually solitary, the filiform pedicels 8–20 mm. long; corolla white, about equaling the calyx lobes; capsule 2.5–3 mm. long.

OREGANDRA Standl.

Glabrous trees; leaves opposite, short-petiolate; stipules deciduous; flowers pedicellate, in terminal, many-flowered panicles; hypanthium obovoid; calyx short, 5-dentate; corolla cylindric-campanulate, the tube obconic, glabrous within, the 5 lobes short, rounded, imbricate; stamens inserted near the base of the corolla tube, the glabrous filaments exserted; ovary 2-celled, many-ovulate.—The genus consists of a single species.

Oregandra panamensis Standl. Field Mus. Bot. 4: 265. 1929. Talamanca Valley, Panama, *Cooper & Slater 144*. Doubtless extending into Costa Rica. Branchlets terete or subcompressed; petioles 1–1.5 cm. long, the blades oblong, obovate-oblong, or rarely ovate, 14–22 cm. long, 5.5–11 cm. wide, acute or abruptly short-acuminate, acute or almost rounded at the base, the lateral nerves 8–9 on each side; panicles 6.5–7.5 cm. long, 8–11 cm. broad, the stout pedicels 2–4 mm. long; calyx 1.5 mm. high, 2.5–3 mm. broad, remotely 5-denticulate; corolla tube 3.5 mm. long, the lobes 1.5–2 mm. long; anthers linear, 3 mm. long. The genus probably is related to *Sickingia*.

PALICOUREA Aubl.

Shrubs or small trees; leaves opposite or ternate, petiolate, usually somewhat coriaceous; stipules persistent, small or large, usually united below to form a short sheath, bilobate, the lobes broad or narrow; flowers small, cymose, corymbose, or paniculate, the panicles often thyrsiform, the inflorescence terminal, the branches usually colored or pale; calyx small, dentate; corolla tubular, with very short lobes, the tube commonly more or less curved and somewhat dilated on one side at the base; ovary 2-celled, the cells 1-ovulate; fruit drupaceous, commonly 2-celled, containing 2 pyrenes.—A few other species are known from Central America. The genus is an American one, and very large, but it is not separated from *Psychotria* by any constant character. Nevertheless it is a convenient group, and the species usually can be referred to the genus by their general appearance, especially by the more or less red, yellow, or blue coloring of the flowers, which extends to the bracts and the branches of the inflorescence.

Leaves ternate..*P. triphylla.*

Leaves opposite.

- Inflorescence corymbiform, flat-topped, the branches erect or strongly ascending and fastigiate; corolla glabrous or minutely puberulent; leaves glabrous or nearly so........*P. fastigiata.*
- Inflorescence paniculate, the branches usually spreading or ascending at a rather wide angle, not fastigiate.
  - Leaves glabrous beneath.
    - Calyx 5 mm. long..........................*P. macrocalyx.*
    - Calyx 1–3 mm. long.
      - Lobes of the stipules obtuse; corolla densely and minutely tomentulose..........................*P. guianensis.*
      - Lobes of the stipules acute to subulate; corolla not tomentulose; leaves small, most of them 2.5 cm. wide or narrower.
        - Calyx lobes 1.5–2.5 mm. long, oblong to spatulate, rounded at the apex; lobes of the stipules 1.5–2.5 mm. long..............................*P. salicifolia.*
        - Calyx lobes less than 1 mm. long, obtuse or acute; lobes of the stipules about 1 mm. long........*P. montivaga.*
  - Leaves variously pubescent beneath, at least along the nerves and costa.
    - Corolla glabrous outside.
      - Calyx lobes conspicuous, 2.5–3 mm. long...*P. macrosepala.*
      - Calyx lobes inconspicuous, scarcely 1 mm. long.
        - Leaves only 4–6 cm. long; corolla 8 mm. long, violet. *P. adusta.*
        - Leaves mostly more than 10 cm. long; corolla more than 1 cm. long, yellow..................*P. Galeottiana.*
    - Corolla puberulent to villous, sometimes only sparsely hirtellous at the apex.
      - Lateral nerves of the leaves about 20 pairs......*P. vestita.*
      - Lateral nerves mostly 15 or fewer pairs.

Leaves narrowly elongate-lanceolate; corolla merely puberulent........................*P. angustifolia.*

Leaves elliptic-oblong to obovate-oblong; corolla hirtellous or villous.

Corolla very sparsely hirtellous, usually only near the apex..........................*P. costaricensis.*

Corolla densely short-villous with spreading or appressed hairs...................*P. lasiorrhachis.*

Palicourea adusta Standl. Journ. Wash. Acad. Sci. 18: 279. 1928. Wet forest, Cerro de Las Vueltas, Prov. San José, 3,000 meters, *Standley & Valerio 43666.* Occasional in forests of the central mountains; region of San Ramón and Zarcero; mostly at 1,800–3,000 meters. Endemic. Sometimes a low, decumbent shrub a meter high or less, but reported also as a tree of 5.5 meters, with a trunk 20 cm. in diameter, the bark brown, slightly roughened, the branchlets sparsely pilose or glabrous; stipule lobes linear, acute, 1–2.5 mm. long; leaves slender-petiolate, elliptic to elliptic-oblong, mostly 4–6 cm. long and 1.5–2.5 cm. wide, but sometimes as much as 3.5 cm. wide, gradually or abruptly acuminate or long-acuminate, obtuse or acute at the base, when young pubescent beneath with short, appressed or spreading hairs, but in age almost completely glabrous; inflorescences cymose-paniculate, sparsely branched, almost as broad as long, the branches puberulent or glabrous; calyx lobes scarcely 1 mm. long, triangular, acute to obtuse; corolla violet, 8 mm. long, glabrous. Noteworthy for the violet flowers. It is possible that two species are represented by the material now referred to this species.

Palicourea angustifolia HBK. *P. lanceolata* Oerst. Vid. Medd. Kjoebenhavn 17. 1852 (Candelaria, 2,100 meters, *Oersted 11556;* photo. of type in Herb. Field Mus.). *P. intermedia* Oerst. ex Polak. Linnaea 41: 571. 1877 (forests of La Carpintera, *Polakowsky 143;* photo. in Herb. Field Mus.). Occasional in forests of the Central region, especially near Cartago; region of Dota; chiefly at 1,400–1,800 meters. Extending to Peru. A slender shrub or small tree, the young branches usually densely puberulent; stipule sheath 4–6 mm. long, the lobes erect, subulate, equaling or longer than the sheath; leaves on very short petioles, mostly elongate-lanceolate, 6–20 cm. long, long-attenuate, obtuse or acute at the base, puberulent or pilose beneath, at least along the nerves; panicles pedunculate, narrow, thyrsiform, the branches pilose or puberulent; calyx very small, acutely dentate; corolla 10–15 mm. long, puberulent or short-pilose,

purple or purplish; fruit 4–5 mm. long, purple-black. *P. angustifolia* is a widely ranging species that exhibits considerable variation, and there is no apparent reason why the two names based on Costa Rican material should not be referred to its synonymy. The species is well marked by its long and exceptionally narrow leaves.

Palicourea Austin-Smithii Standl., sp. nov.—Arbuscula 4-metralis, trunco 9 cm. diam., praeter inflorescentiam omnino glabra, ramis gracilibus, vetustioribus ochraceis vel brunneis, novellis viridibus, internodiis breviusculis; stipulae 3–4 mm. longae virides ad medium vel profundius lobatae, lobis approximatis erectis triangularibus acutis vel acuminatis; folia inter minora breviter petiolata firme membranacea, petiolo 8–12 mm. longo; lamina lineari-lanceolata vel anguste oblongo-lanceolata 7.5–12 cm. longa, 1.3–2.3 cm. lata longissime anguste attenuata, basin angustatam versus sensim attenuata, supra viridis vix lucida, costa nervisque prominentibus, subtus fere concolor, costa gracili elevata, nervis lateralibus utroque latere ca. 17 arcuatis angulo fere recto divergentibus tenerrimis; inflorescentia terminalis sessilis late cymoso-paniculata, ca. 7 cm. longa atque 7 cm. lata, ramis oppositis late divergentibus basi bracteatis sparsissime minute pilosulis, bracteis linearibus viridibus usque 5 mm. longis, floribus in cymulas paucifloras laxas dispositis, pedicellis crassiusculis usque 7 mm. longis ut videtur viridibus; hypanthium basi articulatum latum ca. 1 mm. longum; calycis lobi virides erecti triangulari-ovati obtusi vel acutiusculi 2 mm. longi; corolla alba extus glabra usque 15 mm. longa, tubo crasso ima basi paullo uno latere dilatato fauce ca. 4 mm. lato, lobis triangulari-ovatis obtusis ca. 5 mm. longis; antherae subexsertae; fructus didymo-globosus 5–6 mm. altus.—Palmira, Prov. Alajuela, 2,300 meters, August, 1938, *Austin Smith H1034* (type in Herb. Field Mus.). "Bark pale brown, shallowly striated; leaves highly polished and shining on the upper surface." Material of this species was received too recently to permit its inclusion in the key to species. It is well marked by the long and narrow leaves, and the relatively large, white corolla.

Palicourea Brenesii Standl., sp. nov.—Frutex metralis sparse ramosus, ramulis crassis obtuse tetragonis glabris, internodiis elongatis; vagina stipularis 5 mm. longa et aequilata truncata glabra, lobis remotis erectis subulato-linearibus aequilongis vel paullo longioribus; folia magna petiolata subcoriacea, petiolo crasso glabro 1.5–2 cm. longo; lamina obovato-elliptica vel oblongo-elliptica 9.5–17 cm.

longa 4–8 cm. lata abrupte acuta vel breviter acuminata, basi acuta vel acuminata, glabra, costa nervisque supra prominentibus, costa subtus elevata gracili, nervis lateralibus utroque latere ca. 20 prominentibus gracillimis valde arcuatis angulo fere recto abeuntibus, venulis prominulis laxiuscule reticulatis; inflorescentia thyrsoideo-paniculata erecta dense multiflora 8–10 cm. longa basi ca. 6 cm. lata crasse 3–5 cm. longe pedunculata, ramis brevibus patentibus crassis densiuscule breviter patenti-pilosis, bracteis inconspicuis lineari-lanceolatis usque 6 mm. longis, floribus plerumque breviter peticellatis; hypanthium basi cum pedicello articulatum vix ultra 1 mm. longum crassum puberulum, calyce ca. 1.5 mm. longo profunde lobato, lobis latis obtusis; corolla caerulea extus praesertim ad lobos dense breviter subadpresso-pilosa, tubo crasso 8 mm. longo, lobis subpatentibus oblongis 3 mm. longis; stylus breviter exsertus.—Palmira del Naranjo, in forest, 1,850 meters, April, 1921, *Brenes 3512* (type in Herb. Field Mus.). Palmira, on high, clay ridge, 1,800 meters, September, 1937, *Austin Smith A331*.

Palicourea costaricensis Benth. ex Oerst. Vid. Medd. Kjoebenhavn 38. 1852. Volcán de Barba and Cerros de Candelaria, *Oersted* (photo. of type, *Oersted 11540*, in Herb. Field Mus.). Frequent in mountain forests of the central region, chiefly at 1,500–2,500 meters; region of San Ramón. Panama. A stout shrub of 2–3 meters, the branches usually villous, at least at first; stipule sheath short, the lobes linear-subulate, equaling or often longer than the tube, 3–5 mm. long; leaves short-petiolate, rigid, mostly elliptic-oblong or obovate-oblong and 3–4 cm. wide, acuminate, acute at the base, beneath pilose, at least along the nerves; inflorescence narrowly or broadly paniculate, many-flowered, villosulous or pilose, pale yellow; hypanthium pilosulous or glabrous; calyx lobes usually puberulent, scarcely more than 1 mm. long; corolla yellow, 12 mm. long or less, hirtellous or pilosulous, chiefly on the lobes, or often almost glabrous. The species is a rather vaguely marked one, and should perhaps be included with *P. Galeottiana*.

Palicourea discolor Krause, Bot. Jahrb. 54: Beibl. 119: 40. 1916. Cañas Gordas, 1,100 meters, *Pittier 11161* (photo. of type in Herb. Field Mus.). Known only from the original material. Branchlets glabrous; stipule sheath 5–6 mm. long, the lobes linear, of equal length; leaves large, long-petiolate, glabrous, oblong-elliptic to oblong-obovate, 18–25 cm. long, 9–11 cm. wide, short-acuminate, cuneate-acute at the base, the lateral nerves 18–22 on each side;

panicles long-pedunculate, about 18 cm. long and 7 cm. broad, rather lax and many-flowered, the flowers short-pedicellate; calyx lobes 1.5 mm. long or less, ovate, acute; corolla tube 8–9 mm. long.

Palicourea fastigiata Benth. Thickets or forest of the Atlantic tierra caliente. Extending to Amazonian Brazil. A slender shrub about 2 meters high, almost glabrous; stipules 5 mm. long or less, the broad lobes obtuse or acute; leaves short-petiolate, oblong-elliptic to oblong-ovate, small or medium-sized, thin, blackening when dried, acuminate, usually acute at the base, glabrous; inflorescence long-pedunculate, small, very dense, fastigiately branched, flat-topped, the branches suberect, usually puberulent, the flowers slender-pedicellate; calyx lobes minute, ovate or rounded; corolla yellow, glabrous, 8–10 mm. long; fruit 4–5 mm. long, purple-black.

Palicourea Galeottiana Martens. Frequent in mountain forests of the central region; regions of Dota and San Ramón; 1,000–2,000 meters. Extending to southern Mexico. A shrub or small tree of 2–4.5 meters, the young branches usually glabrous; stipules short, the lobes short or elongate, narrowly triangular to subulate, often much shorter than the tube; leaves short-petiolate, oblong or elliptic-oblong, 7–20 cm. long, acuminate, acute at the base, usually almost glabrous but more or less pilose at least along the costa; panicles usually almost as broad as long, the branches yellow or pale red; calyx lobes scarcely 1 mm. long; corolla pale yellow, commonly 1–1.5 cm. long, glabrous; fruit purple-black, about 5 mm. long.

Palicourea guianensis Aubl. Forests and thickets of the tierra caliente; Cerro de Aguacate. Widely distributed in tropical America. A shrub or small tree, rarely more than 4 meters high, almost glabrous; stipules 8–10 mm. long; leaves large, short-petiolate, elliptic-oblong to ovate or elliptic, mostly 15–25 cm. long and 7–11 cm. wide, acuminate, acute to almost rounded at the base, glabrous or nearly so; panicles large, dense, many-flowered, thyrsoid or pyramidal, the numerous stout branches ascending or spreading, glabrous or puberulent, the flowers pedicellate; calyx lobes minute, deltoid, acute or obtuse; corolla yellow or orange-red, 10–18 mm. long, usually densely furfuraceous-tomentellous; fruit ovoid, 4–5 mm. long.

Palicourea lasiorrhachis Oerst. Vid. Medd. Kjoebenhavn 39. 1852. *Zorrillo amarillo*. Cerros de Candelaria, *Oersted 11557* (photo. of type in Herb. Field Mus.). Frequent in mountain forests of the central region, 1,000–2,500 meters; region of San Ramón. Endemic.

A shrub of 2–3.5 meters, the young branches pilose or villosulous; stipular sheath truncate, the linear-subulate, erect lobes usually much longer; leaves slender-petiolate, elliptic-oblong or obovate-oblong, mostly 10–15 cm. long, acuminate, acute at the base, conspicuously nerved, glabrous above or nearly so, beneath rather densely pilose or villosulous over almost the whole surface or sometimes glabrate; panicles thyrsiform or narrowly pyramidal, many-flowered, pedunculate, villosulous, yellowish; calyx lobes less than 1 mm. long; corolla yellow, about 1 cm. long, slender, villosulous or puberulent outside.

Palicourea macrocalyx Standl. Journ. Wash. Acad. Sci. 18: 278. 1928. Wet forest, Cerro de Las Lajas, north of San Isidro, Prov. Heredia, 2,200 meters, *Standley & Valerio 51611*. Also at La Palma de San Ramón, collected by Brenes. Endemic. A shrub of 2 meters, glabrous throughout; stipules 6–9 mm. long, the lobes triangular-oblong, longer than the sheath; leaves slender-petiolate, oblong-elliptic, 8–12 cm. long, 3.5–5 cm. wide, abruptly short-acuminate, obtuse or acute at the base; panicle much branched, dense, pedunculate, about 6 cm. long and broad, the pedicels 4–6 mm. long; calyx pale yellow, 5 mm. long, the lobes ovate or lanceolate, conspicuously 3-nerved; corolla pale yellow, the tube 9 mm. long, the lobes 2–5 mm. long.

Palicourea macrosepala Krause, Bot. Jahrb. 54: Beibl. 119: 41. 1916. In forest, Alto del Pito, 1,000 meters, *Tonduz 7704* (photo. of type in Herb. Field Mus.). Region of San Ramón, at 1,300 meters or less. Endemic. A shrub of 1.5–3 meters, the branches glabrous or nearly so; stipule sheath short, the lobes linear, erect, longer than the sheath; leaves slender-petiolate, elliptic-oblong or lance-oblong, 10–25 cm. long, narrow-acuminate, acute or acuminate at the base, sparsely pilose beneath along the nerves; panicles many-flowered, pedunculate, 25 cm. long or less, usually thyrsiform, the branches glabrous or nearly so; calyx lobes ovate, subacute, 2.5–3 mm. long, usually recurved in age; corolla white or purplish, the tube 5–7 mm. long.

Palicourea montivaga Standl. Journ. Wash. Acad. Sci. 18: 279. 1928. Wet forest, Yerba Buena, northeast of San Isidro, Prov. Heredia, 2,000 meters, *Standley & Valerio 49850*. Occasional in mountain forests of the central region, 1,800–2,900 meters. Endemic. A dense, slender shrub of 1.5–2.5 meters, the branches glabrous; stipule lobes less than 1 mm. long, the sheath longer; leaves small, slender-petiolate, lance-oblong, mostly 6–7 cm. long, long-acuminate, acute at the base, glabrous; inflorescence about as broad as long, rather lax, many-flowered, the pedicels 2.5 mm. long or less, the branches minutely puberulent or glabrous; calyx 0.6 mm. long; corolla yellow or greenish yellow, glabrous, the tube 7 mm. long.

Uragoga pulchra var. *irazuensis* Kuntze (Rev. Gen. 1: 300. 1891), described from Costa Rica, probably is a species of *Palicourea*, but its position is altogether doubtful at present.

Palicourea salicifolia Standl. Journ. Wash. Acad. Sci. 18: 280. 1928. Wet forest, Laguna de La Chonta, northeast of Santa María de Dota, Prov. San José, 2,000 meters, *Standley 42174*. Type region, at 2,000–2,400 meters; perhaps also in the region of San Ramón. Endemic. A slender shrub of 1.5–3.5 meters, glabrous throughout; stipule lobes linear, 1.5–2.5 mm. long; leaves short-petiolate, narrowly oblong to elliptic-oblong, 6–10 cm. long, long-acuminate, acute to attenuate at the base; inflorescence 4 cm. long and often much broader, many-flowered, pedunculate, the bracts rather conspicuous, green, 7 mm. long or less, usually obtuse, the pedicels 1 cm. long or less; calyx 1.5–2 mm. long; fruit 6 mm. broad. The plant may be better referable to *Psychotria*, the corolla being unknown.

Palicourea subrubra Polak. Linnaea 41: 571. 1877. Cerro de La Carpintera, *Polakowsky 200A* (photo. of type in Herb. Field Mus.). Frequent in mountain forests of the central region; regions of Dota and San Ramón; 1,000–2,200 meters. Panama. A shrub or small tree, 4 meters high or less, glabrous; stipule sheath short, the lobes linear or subulate, equaling or longer than the sheath; leaves short-petiolate, oblong or elliptic-oblong, mostly 10–15 cm. long, narrow-acuminate, acute or subacute at the base; panicles rather large, usually thyrsoid-pyramidal, dense and many-flowered, the branches orange-yellow; calyx lobes minute; corolla yellow, 8 mm. long or less.

Palicourea triphylla DC. Thickets of the Pacific tierra caliente, ascending to Villa Colón, at 1,300 meters. British Honduras to Peru. A shrub about a meter high, or sometimes larger, the branches terete, glabrous or puberulent; stipule lobes linear-attenuate, 6 mm. long; leaves ternate, subsessile, oblong or lance-oblong, large, long-acuminate, puberulent, especially beneath, or finally glabrate; inflorescence long-pedunculate, narrowly thyrsoid-paniculate, dense and many-flowered; calyx lobes obtuse; corolla yellow, 12–15 mm. long, furfuraceous-puberulent; fruit black.

Palicourea vestita Standl. Journ. Wash. Acad. Sci. 18: 277. 1928. Wet oak forest near Quebradillas, about 7 km. north of Santa María de Dota, Prov. San José, 1,800 meters, *Standley 42909*. Collected also in the region of Navarro, 1,500 meters. Endemic. A shrub of 1.5–2.5 meters, the branches densely villous; stipular sheath 5 mm. long, the lobes linear, 5–7 mm. long; leaves petiolate, lance-oblong or obovate-oblong, 10–18 cm. long, 2.5–6 cm. wide, acuminate or long-acuminate, narrowed to the acute or obtuse base, short-villous above along the costa, densely villous beneath on the nerves, the nerves conspicuously elevated; panicles narrowly pyramidal or thyrsiform, 7–9 cm. long or larger, many-flowered, the branches densely villous; calyx lobes 1 mm. long; corolla yellow, 1 cm. long, pilose; fruit blue, 5 mm. long, pilose.

PENTAGONIA Benth.

Shrubs or small trees, simple or branched, the branchlets terete or obtusely tetragonous; leaves very large, opposite, sessile or petiolate, usually coriaceous, entire or pinnatifid, finely lineolate-striate between the veins; stipules large, elongate; inflorescence axillary, sessile or pedunculate, cymose-corymbose, with few or many flowers, the large flowers red or yellow; hypanthium turbinate or campanulate; calyx spathaceous or 5–6-lobate, persistent, coriaceous, the lobes equal or unequal, obtuse; corolla coriaceous, funnelform or tubular, the throat glabrous, the 5–6 lobes short, valvate; anthers included; ovary 2-celled, many-ovulate; fruit baccate, subglobose; seeds numerous, angulate.—Several other species are native in Panama. The genus is one of the most interesting or outstanding of the family, noteworthy for the very large leaves, which are deeply pinnatifid in several species. They are notable also for the curious striation of the leaf tissue, which has been compared with that of moire or watered silk. The leaves, bracts, and stipules often are handsomely colored with red.

Pentagonia Alfaroana Standl. Journ. Wash. Acad. Sci. 17: 171. 1927. *Watsonamra Alfaroana* Standl. op. cit. 15: 287. 1925. Moist forest along the Río Grande de Tárcoles, near Capulín, Pacific coast, 80 meters, *Standley 40194*. Known only from the type region. A simple shrub 1–1.5 meters high; stipules 5 cm. long; leaves petiolate, the blades 40–50 cm. long, about 40 cm. wide, sparsely sericeous, especially when young, pinnatifid two-thirds the distance to the costa, the segments again pinnatifid; cymes few-flowered, sessile or nearly so; fruit globose, 12–15 mm. in diameter; calyx in fruit 2 cm. long, the lobes oblong.

Pentagonia Donnell-Smithii Standl. Journ. Wash. Acad. Sci. 17: 170. 1927. *Watsonamra Donnell-Smithii* Standl. Contr. U. S. Nat. Herb. 17: 442. 1914. Near La Emilia, Llanuras de Santa Clara, 250 meters, *J. D. Smith 6590.* Frequent in forests of the Atlantic tierra caliente; Atlantic slope of the mountains of Guanacaste. Ranging to Honduras. A shrub or tree, sometimes 7.5 meters high, simple or branched; stipules ovate, 5 cm. long; petioles 9–11 cm. long; blades oval or obovate-elliptic, about 45 cm. long and 30 cm. wide, or often larger or smaller, entire, obtuse or acute, obtuse or acute at the base, almost glabrous; calyx 12–15 mm. long, the lobes oval or oblong; corolla yellow, sericeous outside, the tube 2.5 cm. long, the lobes 6–7 mm. long; fruit globose, 2.5 cm. in diameter. In all probability, this should be reduced to synonymy under *P. macrophylla* Benth., a species of Panama.

Pentagonia hirsuta Standl. Journ. Wash. Acad. Sci. 18: 165. 1928. Forests above Tsaki, Talamanca, 500 meters, *Tonduz 9415.* Known only from the original collection. Young branches hirsute; leaves sessile, broadly obovate, about 60 cm. long and 27 cm. wide, narrowed to the short-acuminate apex, attenuate to a narrow, cordate-clasping base, entire, hirsute on both surfaces; hypanthium densely hirsute; calyx 2.5 cm. long, hirsute.

Pentagonia Wendlandi Hook. Bot. Mag. *pl. 5230.* 1861. *Watsonamra Wendlandi* Kuntze, Rev. Gen. 302. 1891. Described from Central American plants of uncertain origin, probably from Costa Rica or Panama. Occurring in the Changuinola Valley, on the border between the two countries; collected also at La Colombiana. A shrub or small tree, simple or branched, the branchlets glabrate; leaves subsessile, oblong-obovate, very large, usually more than 60 cm. long, acutish, narrowed to the narrowly rounded or obtuse base, almost glabrous; calyx sericeous outside, the lobes oval or suborbicular, about as long as the tube; corolla yellow, the tube 2.5 cm. long, the lobes obtuse, erect.

POGONOPUS Klotzsch

Trees or shrubs; leaves opposite, petiolate, the blades large, membranaceous; stipules small, cuspidate, tardily deciduous; flowers showy, pedicellate, in small cymes, these disposed in lax, terminal panicles; hypanthium turbinate; calyx short, 5-dentate, deciduous, one of the lobes expanded into a large, foliaceous, bright-colored limb; corolla tubular, villous in the throat, the short limb 5-lobate, the lobes valvate; anthers exserted; ovary 2-celled, many-ovulate; capsule loculicidally bivalvate; seeds horizontal.—A single species is found in Central America.

Pogonopus speciosus (Jacq.) Schum. *Macrocnemum exsertum* Oerst. Vid. Medd. Kjoebenhavn 45. 1852 (Jaris, 900 meters, *Oersted*). *P. exsertus* Oerst. Amér. Centr. 17. 1863. Guanacaste. Southern Mexico to Venezuela. A shrub or tree, 10 meters high or less; stipules 3–5 mm. long; leaves obovate to oval-obovate, mostly 10–20 cm. long, abruptly acuminate, acute to long-attenuate at the base, sparsely or densely puberulent beneath; pedicels sometimes 1 cm. long; calyx 1 mm. high, the dilated lobe petiolate, rounded-ovate, 1–5 cm. long, rounded to acute at the apex, purple-red; capsule 5–7 mm. long. A showy and handsome tree because of the brightly colored, enlarged calyx lobes.

POSOQUERIA Aubl.

Trees or shrubs, glabrous or pubescent, the branchlets terete; leaves opposite, petiolate, coriaceous; stipules large, deciduous; flowers large, white, in terminal corymbs; calyx short, 5-dentate, persistent; corolla tube slender and much elongate, the limb gibbous in bud, 5-lobate, the lobes obtuse, contorted; anthers exserted; ovary 1–2-celled, many-ovulate; fruit baccate, large, globose or ovoid, 1–2-celled; seeds large, obtusely angulate.—No other species are known from Central America.

Posoqueria grandiflora Standl. Journ. Wash. Acad. Sci. 18: 166. 1928. Wet thicket at Hamburg Finca, Río Reventazón below El Cairo, Prov. Limón, 55 meters, *Standley & Valerio 48706*. Region of the type. Also in Panama. A shrub of 3–5 meters, the branchlets puberulent or scaberulous; stipules obtuse, almost 2 cm. long; leaves short-petiolate, rounded-ovate to broadly elliptic or oblong-elliptic, 13–36 cm. long, 8–21 cm. wide, rounded or obtuse at the apex or abruptly short-acuminate, broadly rounded to acute at the base, glabrous above, densely and minutely pubescent beneath; calyx 4 mm. long, shallowly lobate; corolla glabrous outside, the tube 19–22 cm. long, 3–5 mm. thick, the oblong lobes rounded at the apex, 3.5–4 cm. long; fruit globose, 7 cm. in diameter. Called Wild Coffee by the West Indians of the banana plantations.

Posoqueria latifolia (Rudge) Roem. & Schult. *Fruta de mono, Guayabo de mico.* Frequent in thickets of the Pacific tierra caliente;

Guanacaste. Southern Mexico to Bolivia and Brazil. A shrub or tree of 3–6 meters, glabrous throughout; stipules 8–15 mm. long; leaf blades oval to oblong, 10–25 cm. long, 4–13 cm. wide, acute or short-acuminate, obtuse or rounded at the base; corolla tube 12.5–16.5 cm. long, 2–4 mm. thick, the lobes 1.5–2.5 cm. long; fruit globose, yellow, 4–5 cm. in diameter. The flowers are fragrant. When in blossom, the tree is a handsome and conspicuous one.

PSYCHOTRIA L.

Shrubs or small trees, rarely low and merely suffrutescent plants, sometimes epiphytic; stipules persistent, then usually bilobate, or caducous and then commonly entire; leaves opposite; inflorescence generally terminal, sometimes axillary, variable in form, very rarely headlike and then not or scarcely involucrate, never with a showy involucre of partially united bracts, the flowers mostly small and inconspicuous and white or yellowish; calyx lobes more or less united, short or elongate, sometimes obsolete; corolla short or elongate, the tube straight, often barbate in the throat, the lobes valvate; stamens included or exserted; ovary 2-celled, or very rarely 5-celled; fruit baccate, containing normally 2 nutlets.—A rather large number of other species is found in Central America. The genus is the largest and most complicated of the American Rubiaceae, and is represented abundantly also in tropical regions of the other continents. There are no really definite lines of separation between *Psychotria*, *Palicourea*, and *Cephaelis*, but all these genera are large ones, and in so complicated a group of plants it is convenient to recognize them.

- Inflorescence axillary; stems mostly simple and low, commonly herbaceous or only suffrutescent.
  - Inflorescences capitate.
    - Leaves very obtuse or rounded at the apex, hirsute beneath. *P. polyphlebia.*
    - Leaves acute or acuminate, not at all hirsute....... *P. emetica.*
  - Inflorescences cymose-paniculate, open.
    - Leaves densely villous or villosulous beneath.... *P. Siggersiana.*
    - Leaves glabrous or nearly so.
      - Inflorescence sessile or subsessile............... *P. Tonduzii.*
      - Inflorescences long-pedunculate.
        - Leaves carnose, pale beneath; fruit red....... *P. uliginosa.*
        - Leaves membranaceous, green beneath; fruit white. *P. macrophylla.*

Inflorescences normally terminal, a few sometimes axillary; shrubs or small trees, usually much branched.

- A. Stipules caducous, entire or nearly so, brown or ferruginous; plants generally blackening when dried. Subgenus *Mapouria.*
  - Leaf blades cordate at the base.............*P. Wendlandiana.*
  - Leaf blades acute to rounded at the base.
    - Young branches densely pilose or villosulous with long or short hairs.
      - Leaves small, 3.5 cm. long or less............*P. parvifolia.*
      - Leaves large, 7–12 cm. long or more.
        - Inflorescence sessile or nearly so; leaves densely puberulent beneath...................*P. psychotriaefolia.*
        - Inflorescence long-pedunculate; leaves almost glabrous. *P. Jimenezii.*
    - Young branches glabrous or nearly so, sometimes minutely puberulent.
      - Flowers glomerate, the glomerules spicate, the spikes paniculate; leaf blades long-attenuate to the base..*P. viridis.*
      - Flowers glomerulate or scattered, but not in spicate glomerules.
        - Flowers in small, solitary, sessile heads subtended by large, brown, membranous bracts.....*P. chagrensis.*
        - Flowers not capitate.
          - Calyx deeply lobate, the lobes lance-linear. *P. horizontalis.*
          - Calyx shallowly dentate, the teeth broad.
            - Flowers all or chiefly on short or elongate pedicels.
              - Leaves essentially sessile, the petioles broadly marginate to the base...........*P. orosiana.*
              - Leaves conspicuously petiolate.
                - Panicles long-pedunculate.
                  - Branches of the panicle puberulent; flowers short-pedicellate...........*P. sylvivaga.*
                  - Branches of the panicle glabrous; flowers long-pedicellate................*P. marginata.*
                - Panicles sessile or nearly so.
                  - Stipules mostly 3–4.5 cm. long. *P. grandistipula.*
                  - Stipules mostly less than 1 cm. long.

Leaf blades 3–4 cm. wide. *P. sarapiquensis.*

Leaf blades mostly 8–10 cm. wide. *P. limonensis.*

Flowers all sessile or nearly so.

Leaf blades all or mostly less than 3.5 cm. long. *P. graciliflora.*

Leaf blades much larger.

Base of the leaf blade sharply differentiated from the petiole, narrowed to an obtuse or subacute base, the petiole scarcely 5 mm. long .... *P. quinqueradiata.*

Base of the leaf blade gradually narrowed into the elongate petiole.

Panicles pedunculate....... *P. carthaginensis.*

Panicles sessile or nearly so.

Leaves 8–12 cm. wide; panicles large and open..................... *P. magna.*

Leaves less than 7 cm. wide; panicles small and dense............ *P. granadensis.*

AA. Stipules persistent, usually green or greenish, variable in form, most often deeply bilobate or connate into a truncate sheath which is produced into short or elongate lobes.

Fruit 5-celled; leaves elliptic or oblong-elliptic, short-acuminate, decurrent at the base, glabrous or nearly so... *P. racemosa.*

Fruit 2-celled.

Plants epiphytic; leaves thick and fleshy, glabrous; stipules very short, with obtuse lobes, these usually caducous.

Leaves linear-lanceolate, 5 mm. wide or less.... *P. Maxonii.*

Leaves much broader and larger.

Leaf blades 2–3.5 cm. wide, the nerves prominent beneath............................ *P. pithecobia.*

Leaf blades 6–15 mm. wide, the nerves obsolete. *P. orchidearum.*

Plants terrestrial; leaves not fleshy; stipule lobes usually persistent and most often acute to subulate.

Inflorescence composed of one or more dense heads subtended by large, often brightly colored bracts, the heads large or small; bracts of the small heads at least longer than the calyx.

Flower heads few or numerous, more than one.
  Inflorescence cymose, the heads 1.5 cm. or more in diameter .... *P. chiapensis.*
  Inflorescence pyramidal-paniculate, the heads less than 1 cm. in diameter .... *P. brachiata.*
Flower heads solitary at the ends of the branches.
  Peduncles glabrous .... *P. ramonensis.*
  Peduncles pilose or puberulent.
    Larger bracts 2–4, very unequal, long-attenuate. *P. involucrata.*
    Larger bracts numerous, subequal, obtuse or subacute .... *P. suerrensis.*

Inflorescence usually open, never with large or colored or green, conspicuous bracts, never of heads subtended by broad or elongate bracts.
  Branches densely pilose or hirsute with long or short hairs; calyx dentate.
    Leaves abundantly hirsute on the upper surface.
      Inflorescence lax and openly branched . *P. Brenesii.*
      Inflorescence dense and small, the branches very short .... *P. costaricensis.*
    Leaves not hirsute on the upper surface.
      Corolla 12 mm. long or more; stipules entire. *P. hondensis.*
      Corolla 7 mm. long or less; stipules bilobate.
        Corolla glabrous; leaves mostly 8–10 cm. wide. *P. Mortoniana.*
        Corolla puberulent or pilose; leaves narrower.
          Branches conspicuously constricted at the nodes when dry; inflorescence dense and compact, the branches all very short . . . *P. hebeclada.*
          Branches not contracted at the nodes when dried; inflorescence open, the lower branches elongate.
            Pubescence of the lower leaf surface of long, closely appressed hairs .... *P. Pittieri.*
            Pubescence of the lower leaf surface of minute, spreading hairs .... *P. dispersa.*

Branches glabrous or puberulent; calyx sometimes truncate.
  Stipules large, entire, often 2 cm. long..... *P. grandis.*
  Stipules less (usually much less) than 1 cm. long.
    Calyx truncate.
      Stipule lobes caducous, membranous; calyx 1 mm. long or more.................. *P. microdon.*
      Stipule lobes persistent, stiff, subulate; calyx scarcely 0.5 mm. long.
        Branches of the panicle erect or strongly ascending.................. *P. Valeriana.*
        Branches of the panicle spreading or somewhat reflexed.................... *P. cuspidata.*
    Calyx evidently dentate.
      Inflorescence capitate........... *P. haematocarpa.*
      Inflorescence not capitate.
        Inflorescence cymose-umbellate, compact, subglobose, 2–4.5 cm. broad, the primary branches only 4–7 mm. long. . *P. Alfaroana.*
        Inflorescence not cymose-umbellate, commonly paniculate or corymbiform.
          Lowest branches of the inflorescence not bracteate at the base, the inflorescence narrow, thyrsoid, the branches often reflexed..................... *P. patens.*
          Lowest branches of the panicle bracteate at the base.
            Branches of the inflorescence densely short-pilose.
              Inflorescence corymbiform. *P. pubescens.*
              Inflorescence typically pyramidal-paniculate.................. *P. Berteriana.*
            Branches of the inflorescence glabrous or very minutely puberulent.
              Leaves lance-linear, 9–16 cm. long, 1.5–2.5 cm. wide......... *P. Torresiana.*
              Leaves relatively broader, oblong-lanceolate to elliptic.

Inflorescence open-paniculate; leaves mostly 1.5–2.5 cm. wide. *P. Goldmanii.*

Inflorescence corymbiform; the leaves mostly 4–7 cm. wide. *P. eurycarpa.*

Psychotria Alfaroana Standl. Journ. Wash. Acad. Sci. 18: 273. 1928. Wet forest, El Arenal, Guanacaste, 500 meters, *Standley & Valerio 45179.* Mountains of Guanacaste, 500–700 meters; Pejivalle, at 900 meters. Endemic. An erect shrub of 30–60 cm., usually simple but sometimes sparsely branched; stipules 8–18 mm. long, oblong-ovate, cleft to below the middle, the lobes linear; petioles 1–2 cm. long, the blades obovate-oblong to elliptic, 12–25 cm. long, 4–9 cm. wide, acute or abruptly acute, usually long-attenuate to the base, glabrous or nearly so; inflorescence terminal, cymose-umbellate, the primary branches several, 4–7 mm. long, sordid-puberulent or glabrate, the pedicels 2–4 mm. long, the inflorescence pedunculate, subglobose, in fruit 2–4.5 cm. broad; fruit red, 8–10 mm. long.

Psychotria Berteriana DC. *P. angustiflora* Krause, Bot. Jahrb. 54: Beibl. 119: 43. 1916 (Las Vueltas, Tucurrique, 600–700 meters, *Tonduz 12996;* photo. of type in Herb. Field Mus.). Forests of the Atlantic tierra caliente; region of San Ramón; at 1,200 meters or less. West Indies. A slender shrub of 2–4.5 meters, the branches glabrous or minutely puberulent; stipules persistent, broad, shallowly bilobate; leaves petiolate, membranaceous, lance-oblong or oblong-ovate, 15–18 cm. long and 5–6.5 cm. wide, or often smaller, long-acuminate, rounded to acute at the base and usually abruptly decurrent, sparsely villosulous beneath or often almost glabrous; panicles terminal, large and broad, usually long-pedunculate, lax, and open, generally pyramidal, as much as 16 cm. long and broad but often much smaller, the branches densely short-pilose, the flowers mostly short-pedicellate; calyx minute and remotely dentate; corolla greenish yellow, minutely pilose or almost glabrous, 10 mm. long or less. *P. crebrinervia* Standl., described from Honduras, to which Costa Rican material has been referred, probably is synonymous with *P. Berteriana.*

Psychotria brachiata Swartz. Atlantic tierra caliente. Mexico to Peru. A shrub of 4 meters or less, the branches glabrous; stipules persistent, short, bilobate, the lobes obtuse or rounded; leaves petiolate, oblong-obovate to oblong-elliptic, short-acuminate, acute or attenuate at the base, glabrous or nearly so, often pilose beneath on the costa; inflorescence terminal, long-pedunculate, thyrsoid-paniculate or racemose, the opposite branches divaricate, subtended at the base by long, narrow bracts, the flowers in small, dense, many-bracteate heads; corolla white or ochroleucous; fruit blue.

Psychotria Brenesii Standl., sp. nov.—Frutex 2–3-metralis ramosus, ramis obtuse tetragonis crassis densissime pilis perlongis patentibus sordidis pilosis, internodiis brevibus; stipulae persistentes 1 cm. longae et ultra breviter bilobae, lobis acutis vel acuminatis, longipilosae vel glabratae; folia majuscula petiolata membranacea, petiolo crassiusculo 1.5–3.5 cm. longo dense longipiloso; lamina oblongo-obovata 11–19 cm. longa 5–8 cm. lata cuspidato-acuminata, basi acuta, supra dense pilis longissimis laxis pilosa, subtus paullo pallidior ubique longipilosa, costa gracili elevata, nervis lateralibus utroque latere ca. 18 teneris prominentibus arcuatis obliquis, venis laxe reticulatis; inflorescentia terminalis sessilis atque basi trichotoma laxa ca. 10 cm. longa atque aequilata, ramis primariis usque 5 cm. longis dense pilosis, floribus cymosis sessilibus vel breviter pedicellatis, in cymas paucifloras laxe cymose dispositis, ramis basi bracteatis, bracteis angustis usque 7 mm. longis pilosis; calyx cum hypanthio usque 5 mm. longus ubique dense pilis longis laxis patentibus indutus, profunde lobatus; corolla lutea ca. 12 mm. longa, densissime pilis longis patentibus pilosa, lobis brevibus intus glabris. —Los Angeles de San Ramón, Cerros de La Balsa, March, 1928, *Brenes 6050* (type in Herb. Field Mus.). Wet forest, Cerros de San Antonio de San Ramón, 1,100–1,200 meters, *Brenes 5648*. Related to *P. costaricensis*, but conspicuously different in the form and details of the inflorescence.

Psychotria carthaginensis Jacq. Forests and thickets of the tierra caliente, especially of the Pacific; region of San Ramón; Guanacaste; at 900 meters or less. Widely distributed in tropical America. An almost glabrous shrub of 1–3 meters; stipules large and thin, obovate, obtuse, brownish, caducous; leaves short-petiolate, lance-elliptic to oblong-obovate, usually broadest at or above the middle, acute or acuminate, acute to attenuate at the base, puberulent beneath along the nerves or glabrate; inflorescence pedunculate, terminal, paniculate, open, usually radiate-branched from the base, many-flowered, the minute bracts deciduous; flowers mostly sessile and glomerate; calyx obsoletely dentate; corolla white, glabrous or minutely puberulent, 4 mm. long; fruit at first yellow, turning red, 4 mm. long.

Psychotria chagrensis Standl. In forest, region of El Cairo, Atlantic coast. Panama to Nicaragua. A dense shrub of 1–2 meters, the slender branches glabrous; stipules 8–10 mm. long, triangular-ovate, long-cuspidate, thin, brown, caducous; petioles 4–12 mm. long, the blades elliptic-obovate, 5–8 cm. long, 2–3 cm. wide, abruptly acute-acuminate, cuneately decurrent to the base, glabrous; flowers in few-flowered, terminal heads, the head surrounded by bracts similar to the stipules, the flowers sessile; calyx lobes linear; corolla white, glabrous outside, villous in the throat, the tube 4 mm. long; fruit 5 mm. long.

Psychotria chiapensis Standl. *Cephaelis tetragona* Donn. Smith, Bot. Gaz. 61: 376. 1916, non *Psychotria tetragona* Seem. 1865–67 (Tuis, *Tonduz 11352*). Thickets and forest of the tierra caliente. Panama to southern Mexico. A shrub or sometimes a small tree with a dense, rounded crown, the branches glabrous or obscurely villosulous; stipules persistent, small, bilobate, the lobes broad, obtuse; leaves short-petiolate, elliptic-oblong, mostly 12–20 cm. long and 5–10 cm. wide, short-acuminate, acute or acuminate at the base, glabrous; inflorescence terminal, the flowers subcapitate, the large heads corymbose or cymose, the large, broad bracts rounded at the apex; calyx 5–6 mm. long, puberulent, denticulate; corolla white, almost glabrous, the slender tube as much as 3 cm. long, the narrow lobes 8 mm. long. This plant is extraordinary because of the extremely elongate corolla, fantastically large when compared with that of other species. It is not placed very satisfactorily in *Psychotria*, and might be referred equally well to *Cephaelis*. Quite possibly it should be placed in a distinct genus. Cufodontis has reported the plant as scandent, but such a habit in this group would be most unusual; other collectors report it as an erect shrub or tree.

Psychotria costaricensis Polak. Linnaea 41: 571. 1877. In forest, Angostura, *Polakowsky 384A* (photo. of type in Herb. Field Mus.). Forests of the Atlantic tierra caliente; region of San Ramón; at 1,150 meters or less. Ranging to Guatemala. A slender shrub of 1.5–3 meters, the stems densely long-pilose; stipules persistent, about 1 cm. long, deeply bilobate; leaves slender-petiolate, membranaceous, oblong-elliptic, sometimes 30 cm. long and 11.5 cm. wide but usually considerably smaller, abruptly long-acuminate, acute at the base, densely long-pilose or hirsute on both surfaces; inflorescence terminal, pedunculate, usually thyrsoid and very dense but sometimes rather open, the flowers crowded into headlike glomerules, the bracts ovate, green, like all parts of the inflorescence densely long-pilose; fruit blue. A rather isolated species, noteworthy for the abundant, long pubescence on all parts. It is questionable whether the Central American plant is different from the Peruvian *P. pilosa* Ruiz & Pavón, with which Polakowsky originally compared it.

Psychotria cuspidata Bredem. Forests of the Atlantic tierra caliente, ascending to the region of Navarro; region of San Ramón; Guanacaste; at 1,400 meters or less. Widely distributed in tropical America. A slender, glabrous shrub of 1.5–3 meters; stipules green, persistent, short, bicuspidate; leaves thin, short-petiolate, bright green when dried, the nerves often reddish, ovate to elliptic or oblong-elliptic, very narrowly long-acuminate, the acumination usually somewhat curved, acute to obtuse at the base; inflorescence terminal, pedunculate, thyrsoid-paniculate, much shorter than the leaves, rather few-flowered, the few pale branches often reflexed, not bracteate at the base; calyx minute, truncate; corolla glabrous, 5 mm. long, white or pale yellow; stamens exserted; fruit didymous-globose, smooth, black at maturity.

Psychotria dispersa Standl. Journ. Wash. Acad. Sci. 18: 184. 1928. Wet forest, Los Ayotes, near Tilarán, Guanacaste, 600 meters, *Standley & Valerio 45548*. Common in forests of the tierra caliente; region of San Ramón; Guanacaste; at 1,000 meters or less. Panama to Guatemala. A slender shrub of 1–2 meters, the branches short-pilose with spreading hairs; stipule sheath 2.5–3 mm. long, the lobes linear, 3–6 mm. long; leaves short-petiolate, oblong-elliptic to lance-oblong, 6–10 cm. long, 2–4 cm. wide, abruptly acuminate, acute and often decurrent at the base, beneath pilose on the nerves with short, spreading hairs; panicles terminal, small, 2–4 cm. long and equally broad, the branches hirtellous, the flowers sessile or subsessile; calyx less than 1 mm. long, the teeth triangular; corolla white, puberulent, 3–3.5 mm. long; fruit blue, 3 mm. long. The panicles are usually recurved or reflexed.

Psychotria emetica L. f. *Raicilla. Cephaelis emetica* Pers.; *Uragoga emetica* Baill. Occasional in deep forests of the Atlantic tierra caliente. Guatemala to Bolivia. A slender, usually simple shrub, 60 cm. high or less, with rather thick, somewhat nodose roots, the stems puberulent; stipules 3–4 mm. long, triangular-lanceolate, acuminate; leaves short-petiolate, dark when dried, elliptic-oblong to oblanceolate-oblong, about 11 cm. long and 3.5 cm. wide, acute or acuminate, acute to long-attenuate at the base, glabrous above, puberulent or glabrate beneath; flowers capitate, the heads small and few-flowered, axillary, pedunculate, about equaling the petioles, or shorter, solitary or geminate, the bracts minute; calyx obscurely dentate; corolla small, white, 5 mm. long, glabrous; fruit 6 mm. long, bright blue. The roots of this species yield a kind of ipecac, and are sometimes exported from tropical America for medicinal use.

Psychotria eurycarpa Standl. Journ. Wash. Acad. Sci. 18: 275. 1928. *Cafecillo.* Moist forest, Quebrada Serena, southeast of Tilarán, Guanacaste, 700 meters, *Standley & Valerio 46237.* Mountains of Guanacaste; Atlantic tierra caliente; region of San Ramón; at 1,100 meters or less. Endemic. A shrub or small tree, 2.5–5 meters high, the branches glabrous; stipules persistent, the sheath 1–2 mm. long, the lobes subulate, 1–2.5 mm. long; leaves short-petiolate, elliptic or broadly elliptic, 8–15 cm. long, 3–9 cm. wide, abruptly acuminate, acute to narrowly rounded at the base and often short-decurrent, glabrous, the lateral nerves 6–7 pairs; inflorescence terminal, cymose-paniculate, usually corymbiform, pedunculate, usually broader than long, the branches glabrous or nearly so, the flowers sessile; calyx scarcely 1 mm. long, shallowly dentate or subtruncate; corolla in bud 6 mm. long, pulverulent; fruit blue-black, 9–12 mm. long. Noteworthy for the very large fruits.

Psychotria Goldmanii Standl. In forest, region of San Ramón, about 1,200 meters; mountain forests of the central region, at 1,600 meters or less. Panama. A slender shrub of 2 meters, the branches glabrous; stipules persistent, green, small, bilobate, the short lobes subulate; leaves on short, slender petioles, lance-oblong, 5–8 cm. long, 1–2 cm. wide, narrowly long-attenuate, attenuate at the base, glabrous or sometimes puberulent beneath along the costa, paler beneath; panicles terminal, slender-pedunculate, 3–7 cm. long and of equal breadth, the branches sparsely puberulent, the flowers sessile, the bracts ovate, acute; corolla 5–6 mm. long, white, glabrous; fruit 4 mm. long, blue.

Psychotria graciliflora Benth. ex Oerst. Vid. Medd. Kjoebenhavn 35. 1852. Naranjo, 1,350 meters, *Oersted* (photo. of type in Herb. Field Mus.). Frequent in mountain forests of the central region; region of San Ramón; Dota; Atlantic tierra caliente; chiefly at 1,500 meters or less. Panama to Honduras. A rather dense, very leafy shrub, usually 1–2 meters high, glabrous almost throughout; stipules small, caducous, acuminate, entire or bidentate; leaves blackening when dried, elliptic-oblong or lance-oblong, 8 cm. long and 3 cm. wide or smaller, acuminate, attenuate to the base; inflorescence terminal, cymose-paniculate, pedunculate, small and few-flowered, trichotomous, the flowers mostly sessile, white; calyx less than 1 mm. long, subtruncate; corolla 4 mm. long; fruit blue.

Psychotria granadensis Benth. Thickets of the Atlantic tierra caliente; probably also along the Pacific coast. Panama to Guatemala. A shrub of 1–2 meters, glabrous almost throughout; stipules large, ovate, obtuse, ferruginous, caducous; leaves petiolate, oval-oblong, elliptic, or ovate, 11–15 cm. long, acuminate or long-acuminate, attenuate to the base or abruptly decurrent; panicles terminal, sessile, small, dense, at least in flower, the flowers sessile or subsessile; calyx very short, subtruncate; corolla white, 4 mm. long or less, densely villous in the throat; fruit red. Perhaps only a glabrous form of *P. undata* Jacq.

Psychotria grandis Swartz. *P. subsessilis* Benth. ex Oerst. Vid. Medd. Kjoebenhavn 32. 1852 (Turrialba, 900 meters, *Oersted*). Forests of the Atlantic tierra caliente. Guatemala to Colombia and West Indies. A large shrub or small tree, seldom more than 4 meters high, glabrous almost throughout; stipules broadly ovate, large, cuspidate-acuminate, subpersistent; leaves almost sessile, very large, cuneate-obovate or oblong-obovate, abruptly short-acuminate, long-attenuate to the base, blackening when dried; inflorescence terminal, large, long-pedunculate, radiately branched at the base, the branches minutely puberulent, the flowers sessile; calyx obscurely denticulate; corolla white, 3 mm. long, glabrous outside, barbate in the throat. The flowers are said to be fragrant. This species really belongs to the subgenus *Mapouria* (treated as a genus by many authors), but the stipules are long-persistent, rather than caducous as in most Mapourias. They also are much larger and broader than is usual in that group.

Psychotria grandistipula Standl. Journ. Wash. Acad. Sci. 18: 276. 1928. Moist forest near Santa María de Dota, Prov. San José, 1,600 meters, *Standley & Valerio 43268*. Regions of Dota and San Ramón; Zarcero; Atlantic tierra caliente. Endemic. A shrub of 3 meters, or sometimes a tree of 7 meters, with a trunk 10 cm. or more in diameter, the bark smooth, the branchlets very minutely puberulent; stipules 1 at each node, forming a sheath about the young leaves, cleft along one side, 3–4.5 cm. long, attenuate to a subulate apex, membranous, brown; leaves slender-petiolate, lance-oblong to oblong-ovate or elliptic, 6–14 cm. long, 2.5–6 cm. wide, abruptly long-acuminate, usually very obtuse to truncate at the base but sometimes acute, minutely puberulent beneath on the nerves, otherwise glabrous; inflorescence cymose-paniculate, usually sessile, 4–13 cm. long, the branches minutely puberulent, the pedicels 3–12 mm. long; calyx less than 1 mm. long, shallowly dentate; corolla white, 5 mm. long, glabrous, not barbate in the throat; fruit bright red, 7 mm. long.

Psychotria haematocarpa Standl. Journ. Wash. Acad. Sci. 18: 274. 1928. Moist forest, Naranjos Agrios, near Tilarán, Guanacaste, 600–700 meters, *Standley & Valerio 46407*. Collected also at Pejivalle, Prov. Cartago, 900 meters. Endemic. A shrub of 1–2.5 meters, the branches glabrous; stipules persistent, green, the short sheath bicuspidate, the lobes linear-subulate, 3–4 mm. long; leaves on very short petioles, elliptic-oblong, 9–14 cm. long, 2.5–5 cm. wide, long-acuminate, acute or attenuate at the base and decurrent, glabrous; inflorescence terminal, capitate, dense and few-flowered, the peduncle 3–4 mm. long, puberulent, the outer bracts lance-linear, 2 mm. long, the flowers sessile or subsessile; fruit bright red, 5 mm. long.

Psychotria hebeclada DC. Forests of the Atlantic tierra caliente; Aguacate. Mexico to Ecuador. A shrub, usually 2 meters high or less, the branches terete, densely puberulent or short-pilose; stipules short, green, persistent, bidentate; leaves membranaceous, short-petiolate, ovate to oblong-elliptic, acuminate, acute or attenuate at the base, finely pubescent, at least beneath; inflorescence terminal, thyrsoid-paniculate, small, dense, many-flowered, densely short-pilose; calyx lobes short, ovate; corolla whitish, 5 mm. long, short-pilose; fruit glabrate, subglobose, 4 mm. long.

Psychotria hondensis Standl. Journ. Wash. Acad. Sci. 18: 183. 1928. Forests of Río Hondo, Atlantic slope, 100 meters, *Pittier 16161*. Atlantic tierra caliente. Endemic. A shrub of 3 meters, the young branches densely puberulent or short-pilose; stipules persistent, broadly triangular, narrowed to an obtuse apex; petioles short and stout, the blades broadly elliptic to elliptic-oblong, 18–29 cm. long, 6–15 cm. wide, acute or acuminate, acute or acuminate at the base, glabrous above, densely velutinous-pubescent beneath; inflorescence terminal, cymose-paniculate, pedunculate, open, rather few-flowered, 5–11 cm. broad, the branches short-pilose, the flowers sessile or subsessile; calyx 2.5 mm. long, subtruncate; corolla in bud 11 mm. long, puberulent-tomentose; fruit 13 mm. in diameter. In preparing the present account of Costa Rican Rubiaceae, I have had at hand only a photograph of the type of this species. I judge that the plant is really a *Coussarea*, but delay its transfer until the type specimen may be re-examined.

Psychotria horizontalis Swartz. *P. longicollis* Benth. ex Oerst. Vid. Medd. Kjoebenhavn 1852: 33. 1853 (based in part on specimens collected on Isla de San Lucas, Golfo de Nicoya, by Oersted). Thickets and forest of the tierra caliente; region of San Ramón; Guanacaste; at 1,000 meters or less. Widely distributed in tropical America, as far south as Ecuador, and north to Mexico. A shrub of 1–3 meters, glabrous or nearly so; stipules ovate-triangular, acute or obtuse, caducous, 3–8 mm. long; leaves short-petiolate, elliptic to oblong-lanceolate, acuminate, acute or obtuse at the base, bright grayish green when dry, glabrous or nearly so; inflorescence terminal, pedunculate, small and rather few-flowered, usually 5-rayed at the base, the branches puberulent, the flowers mostly sessile; calyx deeply 5-lobate, the lobes linear-lanceolate; corolla white, 3–4 mm. long, glabrous; fruit red, glabrous, 4 mm. long.

Psychotria involucrata Swartz. Forests of the tierra caliente; Guanacaste. Widely distributed in tropical America. An almost glabrous shrub, usually 3 meters high or less; stipules short, green, persistent, the lobes very short; leaves on very short petioles, lanceolate to elliptic-ovate, long-acuminate, abruptly contracted and decurrent at the base; inflorescence pedunculate, subcapitate, commonly 1–2 cm. long, short-pedunculate, few-flowered, the short branches purplish, pubescent, the flowers sessile or nearly so; outer bracts narrow, much exceeding the flowers, purple; calyx minute, denticulate; corolla white or ochroleucous; fruit globose, 4 mm. long, black.

Psychotria Jimenezii Standl. Journ. Wash. Acad. Sci. 15: 288. 1925. Wet forest, La Hondura, Prov. San José, 1,400 meters, *Standley 37892.* Regions of Zarcero and San Ramón; 1,000–2,000 meters. Endemic. A shrub or small tree of 2.5–4.5 meters, the branches ferruginous-villosulous; stipules triangular, acute, 1 cm. long, brown, caducous; leaves almost sessile, oblong-oblanceolate, 9–14 cm. long, 2.5–4 cm. wide, long-acuminate, attenuate to the base, puberulent beneath along the nerves, otherwise glabrous; inflorescence terminal, long-pedunculate, cymose-paniculate, open and many-flowered, the branches fulvous-villosulous, the flowers sessile in small, headlike cymes; calyx 1 mm. long, very shallowly lobate; corolla creamy white, 2.5 mm. long, glabrous.

Psychotria limonensis Krause, Bot. Jahrb. 54: Beibl. 119: 43. 1916. Uvita Island, Limón, *Pittier 12681* (photo. of type in Herb. Field Mus.). Region of Limón, Atlantic tierra caliente. Southern Mexico to Colombia. An almost glabrous shrub or small tree; stipules ovate, acuminate, large, ferruginous, caducous; leaves petiolate, elliptic-ovate or oblong-elliptic, 6–12 cm. wide, abruptly short-acuminate, abruptly contracted at the base; inflorescence terminal, sessile, much branched, rather large, usually as broad as long, the flowers mostly short-pedicellate; calyx minutely denticulate; corolla white, 5–6 mm. long, glabrous outside, the throat white-barbate.

Psychotria macrophylla Ruiz & Pavón. *P. anomothyrsa* Schum. & Donn. Smith. Atlantic tierra caliente; Atlantic slope of the mountains of Guanacaste; regions of Dota and Cartago; at 1,700 meters or less. Southern Mexico to Bolivia. Stems usually simple but sometimes branched, 2.5 meters high or less, glabrous or nearly so; stipules short, broad, apiculate, deciduous; leaves large, slender-petiolate, elliptic-oblong to lance-oblong, thin, acuminate, acute to attenuate at the base, glabrous or pruinose-puberulent beneath on the nerves; inflorescences axillary, long-pedunculate, paniculate, rather few-flowered, the branches often reflexed, glabrous or minutely puberulent, the flowers sessile, the bracts minute; calyx denticulate; corolla whitish or yellowish, glabrous, 4–5 mm. long; fruit 4–5 mm. long, glabrous, white.

Psychotria magna Standl. *P. compressicaulis* Schum. Bot. Jahrb. 54: Beibl. 119: 44. 1916 (forests of Tuis, 600 meters, *Pittier 12412*). Known in Costa Rica only from the collection cited. Panama. A shrub of 3 meters, the young branches minutely puberulent or glabrous; stipules caducous; petioles 2–4 cm. long, the blades oblong-elliptic, 18–25 cm. long, 8–11 cm. wide, caudate-acuminate, obtuse or acute at the base, glabrous or nearly so; inflorescence terminal, sessile, cymose-paniculate, large and open, about 10 cm. long and broad, the branches very minutely puberulent, the flowers sessile; calyx undulate, ciliate; corolla yellowish white, 3–4 mm. long, glabrous outside, white-barbate in the throat.

Psychotria marginata Swartz. *P. nicaraguensis* Benth. ex Oerst. Vid. Medd. Kjoebenhavn 1852: 34. 1853 (based in part upon material collected at Jaris by Oersted). Forests of the tierra caliente. Widely distributed in tropical America. An almost glabrous shrub, about 2 meters high; stipules large, ferruginous, oblong to ovate, entire, caducous; leaves short-petiolate, obovate-oblong to oblong-oblanceolate, blackening when dried, abruptly acute or acuminate, long-attenuate to the base, minutely puberulent beneath or glabrate; inflorescence terminal, cymose-paniculate, long-pedunculate, lax, the slender pedicels 2–5 mm. long; calyx teeth short, obtuse; corolla ochroleucous, 3 mm. long, glabrous outside; fruit globose, 3–4 mm. long.

Psychotria Maxonii Standl. Proc. Biol. Soc. Wash. 37: 53. 1924. On mossy tree trunk, Santa Clara de Cartago, 1,950 meters, *Maxon & Harvey 8250.* Occasional in mountain forest of the central region; region of San Ramón; at 1,000–2,000 meters. Endemic. A small, epiphytic shrub, a meter long or less, the branches often reddish, glabrous throughout; stipules united to form a sheath 1–1.5 mm. long; leaves almost sessile, linear-lanceolate, 2.5 cm. long or less, 2.5–5 mm. wide, acute or acuminate, acute at the base, pale beneath, the nerves obsolete; inflorescence cymose, 6–8-flowered, terminal, the pedicels 2–3 mm. long; calyx less than 1 mm. long, dentate; corolla white, the tube 2.5–4 mm. long, glabrous; fruit black. This has smaller leaves than any other Central American species of the genus.

Psychotria microdon (DC.) Urban. *P. pinularis* Sessé & Moc. Thickets of the Pacific tierra caliente; Guanacaste. Mexico to Ecuador. A shrub of 3.5 meters or less, glabrous almost throughout; stipules very short, the lobes caducous, the sheath indurate and pale in age; leaves mostly oblong-obovate, 4–7 cm. long, obtuse to short-acuminate, thin, attenuate to the base, barbate beneath in the axils of the nerves, otherwise glabrous or nearly so; inflorescences terminal, pedunculate, cymose-corymbose, few-flowered, the flowers pedicellate; calyx pale, truncate; corolla white, as much as 10 mm. long.

Psychotria Mortoniana Standl., sp. nov.—Arbor 6-metralis, ramulis subteretibus crassiusculis ubique dense villosulis, internodiis elongatis; stipulae persistentes ca. 1 cm. longae sparse villosulae liberae, fere ad basin bilobae, lobis erectis e basi late triangulari subabrupte longiacuminatis; folia magna breviter petiolata firme membranacea, petiolo crassiusculo 1–2.5 cm. longo dense villosulo; lamina late elliptico-obovata vel obovato-oblonga ad 30 cm. longa et 11 cm. lata, subabrupte longe angusteque attenuato-acuminata, basi acuta, supra in sicco olivacea ad costam villosula, aliter subscabrido-asperata, nervis pallidis, subtus fere concolor, praesertim ad venas molliter villosula, costa gracili elevata, nervis lateralibus utroque latere ca. 25 gracilibus prominulis leviter arcuatis juxta marginem obscure junctis, venulis obscuris laxe reticulatis; inflorescentia terminalis cymoso-paniculata erecta crasse 3 cm. longe pedunculata, ca. 8 cm. longa atque 11 cm. lata, dense multiflora, basi trichotoma, ramis primariis ca. 7 angulo fere recto divergentibus crassiusculis dense fulvo-villosulis, ramis omnibus basi bracteatis, bracteis ad 1 cm. longis oblongo-lanceolatis acuminatis fere glabris, bracteis ultimis multo latioribus interdum fere orbicularibus apice obtusis vel rotundatis, floribus arcte sessilibus aggregatis; hypanthium hirtellum vel glabratum post anthesin valde costatum, calyce vix ultra 1 mm. longo, lobis ovalibus vel ovatis obtusis apice ciliatis; corolla alba extus glabra apice in alabastro late rotundata ca. 7 mm. longa, tubo late obconico, lobis oblongo-ovatis tubo fere duplo brevioribus acutiusculis.—Edge of forest, vicinity of El General, Prov. San José, 950 meters, *Alexander F. Skutch 2697* (type in U. S. Nat. Herb.; photo. in herb. Field Mus.).

Psychotria orchidearum Standl. Journ. Wash. Acad. Sci. 18: 276. 1928. On tree in wet forest, Cerros de Zurquí, northeast of San Isidro, Prov. Heredia, 2,200 meters, *Standley & Valerio 50863*. Also at Palmira and Cerro Gallito, 1,800–2,000 meters. Endemic. A small, epiphytic shrub, 15–30 cm. high, glabrous throughout; stipules forming a truncate, indurate sheath 1–2 mm. long; petioles 2–4 mm. long, the blades elliptic-oblong, 1.5–3 cm. long, mostly 6–12 mm. wide, obtuse or acute, apiculate, cuneate-acute or attenuate at the base, thick and fleshy, paler beneath, the nerves obsolete; inflorescence terminal, cymose-paniculate, lax, few-flowered, pedunculate, 1.5 cm. broad or smaller, the pedicels mostly 3–5 mm. long; calyx 1 mm. long, dentate to the middle or more deeply; fruit red, subglobose, 3 mm. long.

Psychotria orosiana Standl. Journ. Wash. Acad. Sci. 15: 288. 1925. Moist forest near Orosi, Prov. Cartago, *Standley 39803*. Also in the region of Navarro, 1,400 meters. Endemic. A shrub of 1–3 meters, the branchlets glabrous; stipules 5 mm. long, bilobate, caducous; leaves essentially sessile, oblong-obovate or elliptic-obovate, 6–12 cm. long, 2–4.5 cm. wide, abruptly acute or acuminate, gradually or abruptly long-attenuate to the base, glabrous; inflorescence terminal, long-pedunculate, cymose-paniculate, 4–6 cm. broad, open, the branches glabrous, the flowers sessile or short-pedicellate; calyx 1 mm. long, shallowly dentate; corolla greenish white, glabrous, 2.5–3 mm. long.

Psychotria parvifolia Benth. ex Oerst. Vid. Medd. Kjoebenhavn 1852: 36. 1853. Volcán de Barba, 1,800 meters, and Naranjo, at

1,350 meters, *Oersted* (photo. of *Oersted 11637*, from Naranjo, in Herb. Field Mus.). Frequent in mountain forests of the central region; regions of Dota and San Ramón; Atlantic tierra caliente; at 1,800 meters or less. Panama. A rather densely branched, very leafy shrub of 1–2.5 meters, the slender branches puberulent or short-pilose; stipules small, ovate, ferruginous, deciduous, about 4 mm. long; leaves small, slender-petiolate, ovate to oblong-oblanceolate, mostly 3.5 cm. long or less, acute or subobtuse, usually long-attenuate to the base and decurrent, glabrous, paler beneath; flowers 4-parted, cymose, the cymes sessile, few-flowered, the flowers mostly sessile; calyx obscurely dentate; corolla white, 4 mm. long or less, glabrous outside, barbate in the throat; fruit small, globose, red.

Psychotria patens Swartz. *P. flexuosa* Willd. Apparently common in the region of San Ramón, at about 1,000 meters, and doubtless also in the Atlantic tierra caliente. Widely distributed in the lowlands of tropical America. A slender, glabrous shrub, commonly 1–1.5 meters high; stipules short, green, persistent, biaristate; leaves medium-sized or rather small, usually yellowish green when dried, short-petiolate, lanceolate to lance-oblong, long-acuminate, obtuse or acute at the base; inflorescence terminal, slender-pedunculate, thyrsoid-paniculate, often elongate, the short, slender branches mostly reflexed, not bracteate at the base; calyx minute, the teeth triangular; corolla whitish, glabrous, 7 mm. long; fruit white or pale blue, 3 mm. long.

Psychotria pithecobia Standl. Field Mus. Bot. 8: 187. 1930. La Palma de San José, 1,550 meters, *Tonduz 12432.* Collected also at Zarcero, Matina, Santo Domingo de Vara Blanca, and in the region of San Ramón, 1,000–2,200 meters. Panama. An epiphytic, glabrous shrub about 50 cm. high, the branches brown; stipules short, connate to form a truncate, persistent, indurate sheath; leaves petiolate, elliptic-oblong, 5–8 cm. long, 2–3.5 cm. wide, rather long-acuminate, acute at the base, coriaceous when dry, the 10 pairs of lateral nerves prominent on both surfaces; inflorescence terminal, long-pedunculate, cymose-corymbose, 5–7 cm. broad, trichotomous at the base, the pedicels 2–4 mm. long; calyx 1 mm. long, the lobes narrowly triangular, acute; corolla 8 mm. long, white or tinged with pink; fruit dark red or black, 4–5 mm. long, globose. To this species probably is referable all the Costa Rican material that has been referred previously to *P. pendula* (Jacq.) Urban, although it is possible that that West Indian species does occur in the country.

Psychotria Pittieri Standl. Forests of the Atlantic tierra caliente, apparently rare; collected at La Colombiana. Panama. A slender shrub, 1–2 meters high, the branches pilose with rather long, pale, appressed or spreading hairs; stipules persistent, 4–6 mm. long, bilobate, the lobes subulate; leaves small, short-petiolate, elliptic-oblong, 4–5.5 cm. long, 1.5–2.5 cm. wide, hirsutulous above along the costa, appressed-pilose beneath; inflorescence terminal, reflexed in age, cymose-paniculate, about 2 cm. long, few-flowered, the branches pilose, the flowers subsessile; calyx 1 mm. long, the lobes obtuse; corolla white, 4–5 mm. long, minutely appressed-pilose; fruit blue.

Psychotria polyphlebia Donn. Smith, Bot. Gaz. 33: 253. 1902. Forests of Suerre, Llanuras de Santa Clara, 300 meters, *J. D. Smith 6854*. Frequent in forests of the Atlantic tierra caliente, ascending to 900 meters; region of San Ramón, at 1,200 meters or less. Panama and Colombia. Plants suffrutescent, simple, usually 50 cm. high or less, the stems villous with long, ferruginous hairs or glabrate; stipules bifid, soon deciduous; leaves long-petiolate, oblong-obovate, 11–16 cm. long and 5–7.5 cm. wide or smaller, rounded or very obtuse at the apex, attenuate to the base, glabrous above and conspicuously white-punctate, hirsute beneath, the lateral nerves 25–34 pairs, elevated and very conspicuous on both surfaces; flowers capitate, the peduncles axillary, shorter or longer than the petioles, the heads dense and many-flowered, 1.5–2.5 cm. broad or in fruit larger, the outer bracts oblong-ovate, green; calyx denticulate; corolla white, pilose, naked in the throat; fruit red, 7–9 mm. long. An isolated species, in habit similar to some species of *Cephaelis*, but in fact probably related rather to *Psychotria macrophylla*.

Psychotria psychotriaefolia (Seem.) Standl. Forests of the tierra caliente. Extending to Colombia. A shrub of 4 meters or less, the young branches ferruginous-tomentose; stipules caducous, thin, ferruginous, 1.5–2 cm. long, attenuate; leaves short-petiolate, obovate to oblong-oblanceolate, acute or short-acuminate, attenuate to the base, puberulent beneath, at least on the nerves; inflorescences chiefly terminal, sessile, dense, the branches 2 cm. long or less, ferruginous-tomentose, the flowers sessile, glomerate; calyx dentate; corolla white, 3 mm. long; fruit red, 4–5 mm. long, glabrous.

Psychotria pubescens Swartz. *P. glauca* Polak. Linnaea 41: 569. 1877 (in hedges, San José, *Polakowsky 377;* fragment of the type seen, ex herb. Berlin). Frequent in hedges and thickets of the Meseta Central; region of San Ramón; Atlantic slope of Guanacaste; chiefly at 600–1,200 meters; probably in the Atlantic tierra caliente. Mexico, Central America, and West Indies. A shrub, commonly 1–2 meters high, the branches minutely pilose or puberulent, terete; stipules small, persistent, the subulate lobes longer than the short sheath; leaves slender-petiolate, thin, oblanceolate to lance-oblong, 6–14 cm. long, acuminate, usually attenuate to the base, finely puberulent beneath; inflorescence corymbiform, pedunculate, small, many-flowered, densely short-pilose; calyx very small, lobate, the lobes ovate, acute; corolla white or pale yellow, 4 mm. long, puberulent; fruit red or black, 4 mm. long, pilose.

Uragoga pulvinigera Kuntze (Rev. Gen. 1: 300. 1891) is listed in the card index of the Gray Herbarium as doubtfully Costa Rican, but for no evident reason. Kuntze gives no locality for his new species, the type of which has not been found in the herbarium of the New York Botanical Garden, where it should exist, and there is no certainty that the plant is even American.

Psychotria quinqueradiata Polak. Linnaea 41: 570. 1877. *P. Morae* Polak. loc. cit. (San José, *Polakowsky 171;* the species was named for J. Rafael Mora, President of Costa Rica). In hedges near San José and in forests of Cerro de La Carpintera, *Polakowsky 94, 135, 199* (photo. of *No. 135,* from La Carpintera, in Herb. Field Mus.). Frequent in hedges and thickets about San José and Cartago, extending to the Pacific coast; region of San Ramón; Guanacaste; at 1,400 meters or less. Endemic. A shrub of 4 meters or usually less, glabrous; stipules caducous, very obtuse or rounded, 7 mm. long, ferruginous; leaves almost sessile, the petiole less than 5 mm. long, elliptic-oblong or oblanceolate, mostly 7–10 cm. long, acute or acuminate, attenuate to the base, the base itself narrowly truncate to subacute; inflorescence terminal, cymose-paniculate, sessile, umbelliform, radiately branched from the base, the flowers glomerate, sessile, the rays of the umbel mostly simple; calyx obscurely dentate; corolla white, the tube 2 mm. long. Noteworthy for the form of the leaves, the narrow base often truncate.

Psychotria racemosa (Aubl.) Willd. Forests of the Atlantic tierra caliente, ascending to Pejivalle, 900 meters; region of San Ramón. Widely distributed in tropical America. A shrub of 1–1.5 meters, the branches puberulent; stipules persistent, biparted, the stiff, subulate lobes 8–10 mm. long; leaves green when dried, short-petiolate, elliptic-oblong, medium-sized, short-acuminate, acute or abruptly contracted at the base, glabrous or nearly so; inflorescence

terminal, short-pedunculate, thyrsiform, small and dense, minutely hirtellous, the flowers sessile; calyx lobes linear-lanceolate; corolla whitish, hirtellous; fruit 5-celled, 4 mm. long, at first orange-red, becoming black. Differing from all other Central American species in its 5-celled fruit. The species has been referred to a separate genus as *Nonatelia racemosa* Aubl.

Psychotria ramonensis Standl., sp. nov.—Frutex gracilis metralis, ramis teretibus viridibus glabris; stipularum vagina 6 mm. longa viridis glabra, lobis approximatis oblongo-linearibus attenuatis 5 mm. longis erectis; folia modica vel subparva graciliter petiolata firme membranacea, petiolo 7–20 mm. longo glabro; lamina elliptico-oblonga vel lanceolato-oblonga 6.5–13 cm. longa 2.5–4.5 cm. lata subabrupte longe anguste acuminata, apice ipso obtuso, basi subinaequali acuta vel subrotundata atque abrupte decurrens, supra in sicco viridis glabra, costa prominente, subtus paullo pallidior secus costam minute pilosula, aliter glabra, costa gracillimo prominente, nervis lateralibus utroque latere ca. 15 tenerrimis prominulis subarcuatis angulo fere recto divergentibus, nervo altero paullo teneriore inter paria subparallelo, venulis inconspicuis laxe reticulatis; inflorescentia terminalis sessilis vel breviter pedunculata, laxe subcapitata, ca. 2 cm. longa, pauciflora, pedunculo glabro, bracteis foliaceis ut videtur viridibus oblongo-lanceolatis usque 12 mm. longis, interioribus brevioribus abrupte petiolatis extus glabris, intus adpresso-pilosulis, floribus sessilibus; calyx ad apicem fructus persistens ca. 1.5 mm. longus glaber, lobis anguste triangularibus acutis; fructus in statu vivo caeruleus 12 mm. longus, pyrenis vix ultra 4 mm. longis.—Forest of La Palma de San Ramón, by a small stream, 1,250 meters, November, 1925, *Brenes 4599* (type in Herb. Field Mus.).

Psychotria sarapiquensis Standl., sp. nov.—Subgenus *Mapouria.* Arbor 6-metralis praeter inflorescentiam omnino glabra, ramis crassiusculis subteretibus viridibus, internodiis superioribus 3–4 cm. longis; stipulae caducae, non visae; folia mediocria longiuscule petiolata subpapyracea, petiolo gracili 2.5–3 cm. longo; lamina oblonga vel anguste elliptico-oblonga 9–11 cm. longa 3–4 cm. lata subabrupte acuminata, basi acuta vel basin versus angustata atque interdum breviter decurrens, supra in sicco cinereo-viridis, costa subimpressa, nervis planis, venis obsoletis, subtus paullo pallidior, costa pallida prominente, nervis lateralibus utroque latere ca. 8 prominentibus angulo lato adscendentibus subarcuatis, venis obsoletis; inflorescentia terminalis sessilis cymoso-paniculata basi trichotoma, 7 cm. longa atque aequilata, ramis primariis angulo lato

adscendentibus minutissime pulverulento-puberulis, bracteis deciduis, floribus ad apices ramulorum umbellato-aggregatis pedicellatis, pedicellis usque 3 mm. longis; hypanthium minutissime puberulum turbinatum ca. 1 mm. longum basi attenuatum, calyce albido truncato fere 1 mm. alto subpatente, fere 2 mm. lato; corolla viridescens extus minutissime sparse puberula in alabastro apice obtusa, tubo crasso 3 mm. longo superne vix dilatato, lobis triangulari-oblongis 2 mm. longis obtusis subpatentibus intus non barbatis; stylus breviter exsertus.—In forest, Vara Blanca de Sarapiquí, 1,500 meters, *Alexander F. Skutch 3330* (type in U. S. Nat. Herb.; photo. in Herb. Field Mus.).

Psychotria Siggersiana Standl. Journ. Wash. Acad. Sci. 15: 289. 1925. Wet forest near Guápiles, Prov. Limón, 500 meters, *Standley 37210*. Forests of the Atlantic tierra caliente; collected also at Tuis and in the Changuinola Valley. Panama. A simple-stemmed shrub, 2 meters high or less, the stems green, sparsely villous-hirsute or glabrous; stipules green, rounded-deltoid, 7 mm. long, finally deciduous; petioles 4–9 cm. long, the blades elliptic or broadly oval, 20–35 cm. long, 11–17 cm. wide, abruptly short-acuminate at the broad, often rounded apex, acute at the base, villous-hirsute on both surfaces or sometimes glabrate above; inflorescences axillary, cymose-paniculate, many-flowered, sometimes 20 cm. broad, pedunculate, the branches villous-hirsute, the flowers sessile, glomerate; calyx 1 mm. long, the lobes deltoid-ovate; corolla greenish white, 3 mm. long, sparsely short-villous; fruit subglobose, red, 5–6 mm. long.

Psychotria suerrensis Donn. Smith, Bot. Gaz. 27: 337. 1899. Forests of Suerre, Llanuras de Santa Clara, 300 meters, *J. D. Smith 6580*. Forests of the Atlantic tierra caliente. Nicaragua; probably also in Panama. A shrub of 4.5 meters or less, the branches glabrous; stipules 4–5 mm. long, the lobes subulate; leaves very shortly petiolate, oblong-elliptic to lance-oblong, mostly 12–20 cm. long and 4–9 cm. wide, long-acuminate, acute or acuminate at the base, glabrous, usually tinged with red when dried; inflorescence terminal, short-pedunculate, subcapitate, dense and many-flowered, 2.5–4 cm, wide, the peduncle short-pilose, the bracts red, oblong-elliptic. pubescent, mostly 1–1.5 cm. long; calyx minute, subtruncate; corolla white, 12 mm. long; fruit violaceous, puberulent, 4 mm. long.

Psychotria sylvivaga Standl. Journ. Wash. Acad. Sci. 18: 274. 1928. Wet forest, Yerba Buena, northeast of San Isidro, Prov.

Heredia, 2,000 meters, *Standley & Valerio 49989.* Also in the region of El Copey, at 2,200 meters. Panama. A shrub of 1–3 meters, the young branches minutely puberulent or glabrous; stipules caducous, broadly ovate, 8–10 mm. long, ferruginous; leaves slender-petiolate, oblong-oblanceolate or elliptic-oblong, usually broadest above the middle, 9–17 cm. long, 2.5–5.5 cm. wide, abruptly acuminate, long-attenuate to the base, sparsely barbate beneath in the axils of the nerves, otherwise glabrous; inflorescence terminal, cymose-paniculate, long-pedunculate, open, many-flowered, 4.5–9.5 cm. long, the branches minutely puberulent, the pedicels 1–3 mm. long, in fruit sometimes 8 mm. long; calyx 1 mm. long, shallowly dentate or subtruncate; corolla greenish white, glabrous, the tube 5 mm. long; fruit 5–6 mm. long.

Psychotria Tonduzii Standl. Journ. Wash. Acad. Sci. 15: 287. 1925. Wet forest, La Estrella, Prov. Cartago, *Standley 39461.* Frequent in mountain forests of the central region, also in the Atlantic tierra caliente, at 1,500 meters or less. Endemic. A simple shrub about a meter high, the stems green, glabrous; stipules broadly triangular, green, 4 mm. long, at least the base persistent; leaves long-petiolate, elliptic-oblong to obovate-oblong, 19–35 cm. long and 7–14 cm. wide, obtuse or rounded at the apex and cuspidate-acuminate, acute to long-decurrent at the base, glabrous; panicles axillary, usually sessile and branched from the base, the stout branches puberulent, the flowers sessile, densely glomerate; calyx 1.5 mm. long, the lobes broadly ovate, subacute; corolla ochroleucous, 3 mm. long, minutely puberulent.

Psychotria Torresiana Standl. Journ. Wash. Acad. Sci. 15: 288. 1925. Wet forest near Orosi, Prov. Cartago, *Standley 39769.* Endemic, and known only from the original locality. A shrub of 3 meters, the slender branches glabrous; stipules persistent, green, 4 mm. long, the lobes very short, obtuse; leaves slender-petiolate, lance-linear, 9–16 cm. long, 1.5–2.5 cm. wide, narrowly long-attenuate, acute or attenuate at the base, glabrous, pale beneath; inflorescence terminal, slender-pedunculate, open-paniculate, many-flowered, about 11 cm. long and almost as broad, the primary branches divaricate or refracted, glabrous, the flowers sessile or short-pedicellate; calyx 1 mm. long, shallowly dentate; fruit subglobose, blue, 5 mm. long.

Psychotria uliginosa Swartz. Wet forest of the Atlantic tierra caliente; region of San Ramón; Atlantic slope of Guanacaste; at 1,000 meters or less. Southern Mexico to West Indies and Ecuador.

Plants usually simple, herbaceous or suffrutescent, 1.5 meters high or less, glabrous or nearly so; leaves petiolate, obovate to oblong or elliptic-oblong, 25–30 cm. long, 10–12 cm. wide or smaller, fleshy when fresh, acuminate, usually acute or attenuate at the base, very pale beneath; panicles axillary, long-pedunculate, small, trichotomous, the flowers sessile, densely aggregate; calyx 5-dentate; corolla white, 6 mm. long, barbate in the throat; fruit bright red, 6 mm. long, the nutlets strongly compressed.

Psychotria Valeriana Standl., sp. nov.—Frutex gracilis 1–1.5 m. altus praeter inflorescentiam omnino glaber, ramulis teretibus vel subcompressis, internodiis elongatis; stipularum vagina truncata vix 2 mm. longa, dentibus 2 approximatis erectis subulatis vulgo vagina brevioribus; folia inter minora breviter petiolata papyracea, petiolo gracili 8–12 mm. longo; lamina lanceolato-oblonga 7–12.5 cm. longa 2–4 cm. lata longe anguste acuminata, acumine saepe subfalcato, basi acuta vel attenuata, interdum obtusa atque subito decurrens, supra in sicco olivacea lucida, costa nervisque prominentibus, subtus paullo pallidior in sicco vulgo rubrotincta, costa tenui elevata, nervis lateralibus utroque latere ca. 10 arcuatis angulo lato adscendentibus, venulis prominulis laxe reticulatis; inflorescentia terminalis cymoso-paniculata, saepe corymbiformis, vulgo longe graciliter pedunculata sed saepe sessilis 1.5–3.5 cm. longa atque aequilata pauciflora vel multiflora, saepius saltem in statu florifero densa, ramis suberectis vel valde adscendentibus, rare subdivaricatis minutissime puberulis vel glabratis crassiusculis, basi minute bracteatis, floribus sessilibus vel breviter pedicellatis; hypanthium minus quam 1 mm. longum glabrum, calyce vix ultra 0.3 mm. longo truncato vel obsolete minute denticulato; corolla alba extus minutissime pulverulenta 3–4 mm. longa, fauce non barbata, tubo crassiusculo, lobis 5 brevissimis; antherae breviter exsertae.—In forest, Cerros de San Pedro de San Ramón, 1,075 meters, June, 1926, *Brenes 4886* (type in Herb. Field Mus.); also *Nos. 18981, 14309, 4265,* from the same locality. Alto de La Calera de San Ramón, *Brenes 5871.* La Palma de San Ramón, 1,050–1,100 meters, *Brenes 20641, 6200, 5605.* Without locality, *Endres 188.* The species is named for Juvenal Valerio Rodríguez, Director of the Museo Nacional de Costa Rica.

Psychotria viridis Ruiz & Pavón. *P. microdesmia* Oerst. Vid. Medd. Kjoebenhavn 1852: 36. 1853. Jaris, 900 meters, *Oersted* (photo. of type in Herb. Field Mus.). Collected also in the Sixaola Valley. British Honduras to Cuba and Bolivia. A shrub or small tree, glabrous or nearly so; stipules caducous, large, thin, ferruginous; leaves blackening when dried, short-petiolate, obovate or obovate-oblong, acute or short-acuminate, cuneate-attenuate to the base; inflorescence pedunculate, spicate-paniculate, open, many-flowered, the minute flowers sessile in distant glomerules; corolla greenish white; fruit red, 4–5 mm. long. Easily recognized by the spicate branches of the open panicles.

Psychotria Wendlandiana Standl. Journ. Wash. Acad. Sci. 18: 9. 1928. San Miguel (de Naranjo?), *Wendland 781* (photo. of type in Herb. Field Mus.). Collected also at Guápiles and La Hondura de San José, 300–1,300 meters. Endemic. A shrub of 2.5–3 meters, the young branches densely short-villous; stipules caducous, 5–6 mm. long, rounded and bimucronate at the apex; leaves petiolate, ovate-oblong to oblong or oblanceolate-oblong, 9–15 cm. long, 3–5.5 cm. wide, acuminate, narrowed to a truncate or deeply cordate base, more or less short-villous and puberulent beneath; inflorescence terminal, cymose-paniculate, pedunculate, the flowers sessile; calyx dentate; corolla yellow, 2.5–3 mm. long, yellow. Easily distinguished by the cordate leaf bases.

RANDIA L.

Erect trees or shrubs, often armed with axillary or supra-axillary spines; leaves opposite, sessile or petiolate; stipules small, often subconnate; flowers small or large, perfect or unisexual, axillary or terminal, solitary or fasciculate, usually white; hypanthium terete or costate; calyx commonly tubular, lobate or truncate, the lobes often elongate or foliaceous, persistent or deciduous; corolla funnelform to campanulate or salverform, with a short or elongate tube, the throat glabrous or villous, the usually 5 lobes short or elongate, acute or obtuse, contorted; ovary normally 2-celled, the cells many-ovulate; fruit baccate, globose or oval, the pericarp usually hard and thick; seeds numerous or few, immersed in the pulp, commonly horizontal, compressed.—A few other species occur in Central America.

Randia aculeata L. Occasional in thickets of the tierra caliente; known from both coasts. Florida and Mexico to West Indies and Venezuela. A shrub or small tree, rarely more than 3 meters high, armed with stout spines 1.5 cm. long or less; leaves mostly clustered at the ends of the branches or on short, lateral spurs; leaves sessile or on very short petioles, very variable in shape and size, mostly oblong-obovate to obovate-orbicular, and about 3 cm. long, acute to broadly rounded at the apex, rounded to acute at the base, glabrous and lustrous above, glabrous beneath or sparsely pilose on the costa; flowers perfect, terminal, sessile, usually aggregate; calyx and hypanthium 2–3 mm. long, commonly glabrous, the lobes linear to ovate; corolla white, 6–8 mm. long, glabrous outside, the 5 lobes acute or acuminate, equaling or longer than the tube, the throat densely white-barbate; fruit globose, 6–13 mm. in diameter.

Randia armata (Swartz) DC. *Mostrenco, Crucillo.* Thickets of the Pacific tierra caliente; Guanacaste; to be expected also in the Atlantic lowlands. Widely distributed in tropical America. A shrub or small tree, rarely as much as 6 meters high, the branches usually bearing at the apex 4 stout spines 2.5 cm. long or less; leaves slender-petiolate, mostly ovate to oval or obovate, thin, usually 6–15 cm. long, acute or acuminate at each end, glabrous or puberulent above, puberulent or appressed-pilose beneath or glabrate; flowers dioecious, aggregate at the ends of the branches, slender-pedicellate; calyx lobes linear to obovate-oblong, 4–9 mm. long; corolla white or ochroleucous, glabrous or pilose outside, the tube 2.5 cm. long, the throat naked, the lobes rhombic-obovate, 1 cm. long; fruit oval or globose, 1.5–3.5 cm. long, filled with a black, sweetish pulp. The pulp of this and other species is sometimes eaten, but it is unpleasant in appearance, and the flavor is not agreeable. Birds are very fond of the fruits, and it usually is difficult to find a ripe fruit that has not been punctured and robbed of its pulp and seeds.

Randia Brenesii Standl., sp. nov.—Frutex 3–4-metralis, ramis gracilibus teretibus ferrugineis, novellis dense pilis brevibus plerumque patentibus hirtellis, internodiis brevibus; spinae secus ramos sparsae solitariae rigidae, graciles vel crassae, usque 1.5 cm. longae; stipulae minutae; folia parva brevissime petiolata membranacea, petiolo vix ad 2 mm. longo; lamina lanceolato-oblonga 2–4 cm. longa 0.8–1.5 cm. lata acuta vel sensim acuminata, basi acuta vel obtusa, supra viridis glabra, costa prominente, nervis obsoletis, subtus paullo pallidior sparsissime praesertim ad costam hirtella vel fere glabra, costa gracili prominente, nervis lateralibus utroque latere ca. 4 obscuris; flores dioeci ut videtur terminales atque solitarii, sessiles; hypanthium oblongum 5 mm. longum glabrum; calyx 5-partitus, lobis foliaceis viridibus rotundato-ovatis ca. 5 mm. longis atque aequilatis vel latioribus acutiusculis glabratis ciliatis; corolla alba extus glabra, tubo gracili 2–3.5 cm. longo superne paullo dilatato fauce glabro, lobis patentibus ovali-oblongis vel ovato-oblongis obtusis vel subrotundatis intus glabris 13–20 mm. longis; fructus globosus glaber laevis 2 cm. diam.—La Palma de San Ramón, March, 1932, *Brenes 15048* (type in Herb. Field Mus.); also *Nos. 3748* and *6831* from the same locality. Entre San Ramón y La Palma de San Ramón, *Brenes 6180*. *Tonduz 12481* from La Palma de San José in the Berlin herbarium also seems to be referable to this species, which is related to *R. calycosa* Standl., of Panama.

Randia grandifolia (Donn. Smith) Standl. Journ. Wash. Acad. Sci. 18: 166. 1928. *Basanacantha grandifolia* Donn. Smith, Bot. Gaz. 55: 436. 1913. Forests near Santo Domingo, Golfo Dulce, Prov. Puntarenas, *Tonduz 9878*. Forests of the tierra caliente, ascending to the region of Cartago, and on the slopes of La Carpintera. Endemic. A shrub or small tree, 4.5 meters high or less, unarmed, glabrous throughout or nearly so; leaves large, mostly crowded at the tips of the branches, the petioles 3.5 cm. long or less, the blades elliptic to lance-oblong or elliptic-ovate, 12–40 cm. long, 6–15 cm. wide, acute or acuminate at each end, lustrous; flowers dioecious, the staminate ones aggregate, subsessile; calyx 3 mm. long, sparsely short-pilose, the lobes subulate or lanceolate, 1–2 mm. long; corolla white, glabrous outside, the stout tube 12 mm. long, the throat naked, the lobes ovate, 7 mm. long; fruit yellow, globose, 2.5 cm. in diameter.

Randia Karstenii Polak. Linnaea 41: 568. 1877. *Espino blanco, Horquetilla.* In hedges near San José, *Polakowsky 74* and *302*. Frequent from the Meseta Central to the coasts, usually in rather dry thickets; often in roadside hedges; region of San Ramón; Zarcero, at 2,250 meters. Endemic. A shrub or tree, sometimes 7.5 meters high, with a trunk 25 cm. in diameter, the bark thick, gray-brown, slightly roughened, the branches appressed-pilose when young; spines terminal or lateral, stout, 1.5 cm. long or less; leaves on petioles 6 mm. long or less, obovate-oblong to oblong-elliptic, obovate, or ovate, 1.5–7 cm. long, 1–3.5 cm. wide, rounded to acute at the apex, acute at the base, glabrous above, minutely pilose beneath along the nerves or glabrous; flowers perfect, terminal, solitary, sessile; calyx and hypanthium 2–3 mm. long, glabrous, the lobes linear or oblanceolate; corolla white, 6 mm. long, glabrous outside, the throat naked, the lobes broadly ovate, short-acuminate; fruit globose, usually 1 cm. in diameter, but sometimes as much as 2.5 cm. Austin Smith states that the cambium layer stains the hands and clothing yellow. This shrub is much used about the Meseta Central as a hedge plant, a purpose for which it is admirably adapted because of its dense growth and abundant spines.

Randia monantha Benth. has been reported from Costa Rica, probably in error, since at present it is known definitely only from Guatemala and southern Mexico.

Randia panamensis Standl. In forest, region of San Ramón, about 1,100 meters. Panama. A shrub of 1.5–2.5 meters, with slender branches; spines lateral, slender, 5–7 mm. long; petioles 3–6 mm. long, the blades obovate-oblong or oblanceolate-oblong, mostly 8–15 cm. long and 3–6.5 cm. wide, acute or short-acuminate, acute or acuminate at the base, glabrous above, glabrate beneath or strigose on the nerves, short-barbate in the axils of the nerves; flowers few, terminal, fasciculate, the pedicels 5–6 mm. long; calyx lobes 5–7 mm. long, linear-subulate; corolla ochroleucous, the tube 2 cm. long, strigillose, the lobes oval or rounded, 5–6 mm. long, rounded at the apex.

Randia Pittieri Standl. Contr. U. S. Nat. Herb. 20: 201. 1919. *Horquetilla. Basanacantha Pittieri* Standl. op. cit. 18: 134. 1916. Zent Junction, near Matina, Prov. Limón, *Pittier 16036*. Collected also at Escazú, and in Guanacaste. Endemic. Spines terminal in 4's, 3–5 mm. long; petioles 9–14 mm. long, the blades thin, oval or obovate-oval, 12–16 cm. long, 7–10 cm. wide, abruptly acute, rounded or subcordate at the base, shortly setose-pilose above, paler beneath and abundantly setose-pilose; flowers dioecious, solitary or fasciculate, terminal; pedicels of the staminate flowers 4–5 mm. long; calyx lobes subulate, 4 mm. long; corolla glabrous outside, the tube 6 cm. long, glabrous in the throat, the lobes lanceolate or oblong-lanceolate, 2.5–3 cm. long, attenuate.

Randia subcordata Standl. Contr. U. S. Nat. Herb. 20: 201. 1919. *Crucilla. Basanácantha subcordata* Standl. op. cit. 18: 133. 1916. Thickets and roadsides, Nicoya, *Tonduz 13934*. Known in Costa Rica only from the region of Nicoya. Extending to Honduras. A shrub or small tree, the spines borne at or near the apices of the branches, stout, 5–7 mm. long; leaves slender-petiolate, oval to broadly ovate, 4–10 cm. long, 2.5–6 cm. wide, acute or abruptly acute, subcordate or rounded at the base, membranaceous, minutely appressed-setose-pilose on the upper surface, abundantly appressed-pilose beneath; flowers dioecious, white, fragrant; staminate flowers in terminal fascicles of 2 or more, sessile; calyx and hypanthium strigose-sericeous, the lobes linear-subulate, 5 mm. long; corolla densely hirtellous, the tube 5–6 cm. long, the lobes ovate or lanceolate, attenuate, 2.5–4 cm. long; pistillate flowers solitary, the calyx lobes oblanceolate-linear, 15–18 mm. long, the corolla tube 4.5 cm. long.

RAVNIA Oerst.

Glabrous, epiphytic shrubs, the branchlets terete; leaves opposite, short-petiolate, somewhat carnose when fresh, coriaceous when dried; stipules large, oblong, obtuse; flowers large, red, ternate at the ends of the branches, subsessile; hypanthium narrowly turbinate; calyx 5–6-lobate, the lobes unequal, linear; corolla tubular, slightly curved, the tube slender, somewhat ampliate in the throat, constricted below the limb, the 5–6 lobes short, ovate, obtuse, spreading, imbricate; anthers subexserted; ovary 2-celled, many-ovulate; capsule slender-cylindric; seeds very numerous, with a tuft of long, slender hairs at the apex.—The genus consists of only the two species listed here.

Ravnia Pittieri Standl. N. Amer. Fl. 32: 114. 1921. Santa Clara, *Pittier 13461*. Collected also at Pejivalle, 900 meters; near El Cairo; and in the region of San Ramón, 1,000 meters. Endemic. A small shrub; stipules oblong-oblanceolate, 3.5 cm. long, acute, green; petioles scarcely 4 mm. long, the blades linear-lanceolate, 5–20 cm. long, 1.2–4 cm. wide, narrowly long-attenuate, obtuse or acute at the base, the lateral nerves obsolete or obscure; calyx lobes linear, 5–8 mm. long, one or more linear or subulate teeth between each 2 lobes; corolla 5.5 cm. long, the tube 12 mm. wide at the middle, the lobes 5 mm. long. This is probably only a narrow-leaved variety of *R. triflora*.

Ravnia triflora Oerst. Vid. Medd. Kjoebenhavn 49. 1852. Near Cartago and Candelaria, 1,800–2,400 meters, *Oersted 11696* (photo. of type in Herb. Field Mus.). Frequent in forests of the central region; region of San Ramón; at 1,100–2,400 meters. Chiriquí, Panama. A small, epiphytic shrub, usually a meter long or less; stipules 1.5 cm. long; leaf blades elliptic to elliptic-oblong or lance-oblong, mostly 5–10 cm. long, long-acuminate, obtuse or acute at the base; calyx lobes unequal, without interposed teeth; corolla bright red, 5–5.5 cm. long, 7–10 mm. wide above. The plant is a handsome one, although the flowers always are rather few. In general appearance it is more suggestive of the Gesneriaceae than of the Rubiaceae.

RELBUNIUM Hook. f.

Annual or perennial herbs, in habit and general appearance closely resembling *Galium;* leaves verticillate, narrow, small; flowers minute, the pedicels articulate with the involucre, this consisting of 2–4 leaflike bracts; ovary didymous, the cells 1-ovulate; sepals none; corolla rotate, 4-lobate, the lobes valvate; stamens exserted; fruit more or less fleshy and juicy, smooth or tuberculate, normally 2-seeded.—One other species occurs in northern Central America. The genus is closely related to *Galium*, differing in having foliaceous bracts at the base of the flower.

Relbunium hypocarpium (L.) Hemsl. Frequent in forest or thickets of the mountain regions, chiefly at 1,300–3,000 meters. Widely distributed in the mountains of America, from Mexico far southward. A weak-stemmed perennial, the stems sometimes a meter long or more, often subscandent, retrorse-hispidulous; leaves in 4's, oblong to elliptic or obovate, 5–15 mm. long, mucronate, narrowed to the base, more or less pilose and ciliate, the margins revolute; flowers pedicellate, equaling or shorter than the leaves; corolla white, 1–1.5 mm. broad; fruit orange-red, 2–3 mm. long.

RICHARDIA L.

Erect or prostrate annuals, usually with rough pubescence; stipules connate with the petioles into a setiferous sheath; leaves opposite; flowers small or large, densely crowded in terminal, involucrate heads; ovary 3–4-parted, the cells 1-ovulate; sepals 4–6, more or less connate at the base; corolla funnelform, the lobes valvate; fruit consisting of 3–4 indehiscent, 1-seeded cocci.—The genus is easy of recognition by its fruit, consisting of normally 3 or 4, rather than 2, nutlike cocci that separate at maturity. No other species are known from Central America.

Richardia scabra L. Common as a weed in waste or cultivated ground, Meseta Central to the coasts; region of San Ramón. Generally distributed in tropical America. Plants prostrate or ascending, often forming mats, pilose or hispid throughout; leaves petiolate, oblong or lanceolate, 2–9 cm. long, acute and mucronate; heads dense, few–many-flowered; sepals lanceolate; corolla white, 4–6 mm. long; carpels 3, muriculate, sulcate on the inner face, 2–3 mm. long.

RONDELETIA L.

Shrubs or trees, glabrous or pubescent; leaves opposite or rarely verticillate, sessile or petiolate; stipules usually broad, sometimes foliaceous, commonly persistent; inflorescence terminal or axillary, cymose, corymbose, or paniculate; calyx 4–5-lobate, the lobes often unequal, persistent; corolla funnelform or salverform, white, yellowish, or red, the tube usually slender and elongate, the throat often annular-thickened, sometimes barbate, the lobes spreading, broad, obtuse, imbricate; ovary 2-celled, many-ovulate; capsule small or large, generally globose, bisulcate, loculicidally or septicidally bivalvate; seeds commonly minute, compressed or angulate, often winged or appendaged.—Other species are known from Central America.

Rondeletia amoena (Planch.) Hemsl. *Teresa, Quina. R. rugosa* Benth. ex Oerst. Vid. Medd. Kjoebenhavn 43. 1852 (Cartago, 1,680 meters, *Oersted*). Frequent in forests of the central region, 1,000–2,000 meters; regions of Dota and San Ramón. Panama to southern Mexico. A shrub or small tree, sometimes 5.5 meters high, with a trunk 15 cm. in diameter, but usually smaller, the bark dark cinnamon-brown, smooth; stipules triangular-oblong, obtuse, 1–1.5 cm. long, reflexed; leaves on very stout, short petioles, ovate-oval to oblong-ovate, 6–15 cm. long, abruptly short-acuminate, rounded or subcordate at the base, glabrous or sparsely pilose above, densely short-pilose beneath; inflorescence terminal and axillary, cymose-corymbose, rather dense and many-flowered, about as broad as long; calyx lobes oblong or obovate-oblong, 1–2 mm. long; corolla pink, appressed-pilose, the tube 8–12 mm. long, the throat densely yellow-pilose, the 5 lobes 2–2.5 mm. long; capsule globose, 5–6 mm. in diameter. The shrub is a handsome one because of its abundance of bright pink flowers. It is cultivated at La Sabana in the garden of Doña Amparo de Zeledón, and long ago was introduced into cultivation in Europe.

Rondeletia aspera Standl. N. Amer. Fl. 32: 54. 1918. Puente del Rodeo, below Pacaca (Villa Colón), Prov. San José, *Pittier 3243*. In forest, region of San Ramón, 600–1,000 meters. Endemic. A shrub with slender branches; stipules linear to oblong-lanceolate, 6–10 mm. long, erect; leaves short-petiolate, oblong-elliptic to lance-oblong, 6–10 cm. long, acute or short-acuminate, acute or acuminate at the base, green above, very scabrous with short, slender hairs, densely and closely white-tomentose beneath when young, the tomentum more or less deciduous in age, the surface then short-pilose; inflorescence terminal, cymose-paniculate but often much condensed and headlike, as broad as long; calyx lobes oval to ovate-deltoid, obtuse or rounded, 1–2 mm. long; corolla arachnoid-tomentose, the tube 8–9 mm. long, the throat naked, the 4 lobes rounded, 3 mm. long.

Rondeletia Brenesii Standl., sp. nov.—Ramuli teretes brunnescentes primo dense strigoso-sericei, internodiis brevibus vel elongatis;

stipulae 8 mm. longae brunneae erectae extus sericeo-strigosae e basi triangulari subulato-acuminatae; folia majuscula petiolata membranacea, petiolo usque 1.5 cm. longo sed vulgo fere ad basin anguste alato; lamina oblanceolata vel oblongo-oblanceolata 14–22 cm. longa 4–6.5 cm. lata longissime anguste falcato-attenuato-acuminata, basin versus longe sensim attenuata, supra viridis sparse pilis longis laxis albidis pilosa, subtus paullo pallidior, primo pilis longis laxis subadpressis albidis pilosa, cito glabrata, costa gracili prominente, nervis lateralibus utroque latere ca. 16 obliquis teneris leviter arcuatis; inflorescentia terminalis paniculata, sessilis vel breviter pedunculata, panicula spiciformi ad 16 cm. longa ca. 2.5 cm. lata dense multiflora, floribus sessilibus vel subsessilibus in cymulas parvas paucifloras densas breviter pedunculatas dispositis, ramis dense pilosis, bracteis parvis linearibus viridescentibus inconspicuis; calycis lobi vix 1.5 mm. longi viridescentes late ovales vel semiorbiculares glabrati, hypanthio adpresso-pilosulo; corolla ochroleuca, tubo gracili 5–5.5 mm. longo extus glabro vel infra lobos sparse hirtello, lobis 4 brevibus suborbicularibus basi tantum sparse hirtellis.—Camino de San Ramón a La Calera, March, 1929, *Brenes 6757* (type in Herb. Field Mus.). Río Jesús de San Ramón, February, 1937, *Brenes 22036*. Cuesta de La Vieja, road to San Carlos, 800 meters, April, 1903, *Pittier 16693; Cook & Doyle 39* (both specimens in U. S. Nat. Herb.). Closely related to *R. stachyoidea* Donn. Smith, of northern Central America, and confused with that species by the writer when he prepared the account of the genus for the *North American Flora*. *R. stachyoidea* differs in its narrower, more abundantly and persistently pubescent leaves, its greatly elongate and conspicuous bracts, long and narrow calyx lobes, and longer corolla tube.

Rondeletia buddleoides Benth. Frequent in mountain forests of the central region; Dota and San Ramón; 1,000–2,000 meters. Panama to southern Mexico. Usually a shrub of 2–3 meters, but sometimes a tree of 12 meters, with a trunk 20 cm. in diameter, the bark light gray; stipules lanceolate or oblong, 3–8 mm. long, obtuse to attenuate, erect; leaves on very short petioles, oval-elliptic to elliptic-oblong or lanceolate, 5–12 cm. long, rather thick, acute to long-acuminate, obtuse to long-acuminate at the base, green above, pilose or glabrous, covered beneath with a very dense and close, white tomentum; inflorescence a terminal, spikelike panicle 10–15 cm. long, very dense and many-flowered; calyx lobes oblong or oval, obtuse, 1 mm. long; flowers fragrant; corolla dull white, tomentose

outside, the slender tube 4–8 mm. long, naked in the throat, the 4 lobes 1–1.5 mm. long; capsule 3–4 mm. long.

Rondeletia calycosa Donn. Smith, Bot. Gaz. 56: 59. 1913. In forest, La Palma de San José, 1,460 meters, *Tonduz 11633*. Known also from forests on the slopes of nearby Barba, at about the same elevation. Endemic. A shrub of 2–3 meters; stipules triangular, cuspidate, 3–4 mm. long; leaves very shortly petiolate, lance-elliptic, 6–9 cm. long, 2–3 cm. wide, abruptly acuminate or very long-acuminate, attenuate to the base, glabrous above, pilose beneath along the nerves; inflorescence terminal, cymose-corymbose, 5–6 cm. long and about as wide; calyx lobes linear-lanceolate, 4–7 mm. long; corolla red, strigillose-pilose, naked in the throat, the tube 15–17 mm. long, the 4 lobes 3 mm. long.

Rondeletia costaricensis Standl. N. Amer. Fl. 32: 61. 1918. Near Buena Vista, San Carlos, 900 meters, *Pittier 16696*. Known only from the original collection. Stipules foliaceous, suborbicular, 5 mm. long; leaves short-petiolate, elliptic or oblong-elliptic, 14–18 cm. long, 6.5–8 cm. wide, acuminate, acute at the base, thin, glabrous; inflorescence terminal, cymose-paniculate, rather few-flowered, slender-pedunculate, calyx lobes narrowly triangular, acute, erect, shorter than the hypanthium; corolla minutely appressed-pilose, the slender tube 9 mm. long, the 4 lobes 3 mm. long.

Rondeletia Pittieri Schum. & Krause ex Schum. Bot. Jahrb. 40: 316. 1908. *Teresa.* Río Porós and Río Segundo, 2,000 meters, *Pittier 1729*. Occasional in mountain forests of the central region. Endemic. A shrub or tree of 3–6 meters, similar to *R. amoena;* differing in having the leaves strigose beneath on the nerves, rather than softly and densely pilose over the whole surface.

Rondeletia stenostachya Standl., sp. nov.—Rami graciles teretes ferruginei, novellis densissime pilis subadpressis ferrugineis pilosis, internodiis brevibus vel elongatis; stipulae ca. 7 mm. longae extus dense strigosae, e basi rotundato-ovata subulato-mucronatae persistentes erectae; folia modica sessilia vel brevissime crasse petiolata firme membranacea lanceolata vel anguste oblongo-oblanceolata 8–16 cm. longa 2–4 cm. lata longe anguste attenuato-acuminata, basin versus longe sensim attenuata, supra viridia sparse strigosa, subtus paullo pallidiora ubique dense strigoso-sericea vel in statu adulto subglabrata, nervis lateralibus valde obliquis; inflorescentia terminalis paniculata breviter pedunculata, panicula spiciformi ca.

20 cm. longa vix 2 cm. lata solemniter interrupta, floribus in cymulas parvas paucifloras sessiles dispositis sessilibus vel usque ad 3 mm. longe pedicellatis, bracteis parvis angustis inconspicuis, rhachi dense subadpresso-pilosa; hypanthium dense adpresso-hispidulum; calycis lobi 4 subulati usque triangulares vix ultra 1 mm. longi; corolla extus dense hispidulo-pilosa, tubo crassiusculo 4 mm. longo fauce nudo, lobis 4 late ovalibus ca. 3.5 mm. longis.—La Hondura de San José, 1,300 meters, August, 1933, *Manuel Valerio 769* (type in Herb. Field Mus.), *780*. Similar in appearance to the Guatemalan *R. rufescens* Robinson, which, however, differs in almost all details of pubescence and flower.

Rondeletia Torresii Standl. Journ. Wash. Acad. Sci. 18: 163. 1928. Wet forest, Viento Fresco, Prov. Alajuela, 1,800 meters, *Standley & Torres 47839.* Frequent in mountain forests of the central region; region of San Ramón; 1,000–2,000 meters. Endemic. A slender shrub of 2–3.5 meters; stipules triangular, cuspidate-attenuate, 3 mm. long; leaves on slender petioles 1–3 cm. long, lance-oblong to ovate-oblong or elliptic, 8–12 cm. long, abruptly acuminate or long-acuminate, subobtuse to acute at the base, above green, sparsely puberulent on the costa and often sparsely short-pilose elsewhere, puberulent beneath on the nerves, short-barbate in the axils of the nerves; inflorescence terminal, cymose-corymbose, long-pedunculate, lax; calyx lobes unequal, 3 of them linear or subulate and 1.5–2.5 mm. long, the fourth elliptic to ovate, obtuse, 4–5 mm. long; corolla white, densely short-strigillose, naked in the throat, the tube 13–14 mm. long, the 4 lobes 3 mm. long; capsule 6–7 mm. long.

RUDGEA Salisb.

Shrubs or small trees, most often glabrous or nearly so; stipules bearing on the margins or at the apex or on the dorsal surface subulate or aculeoliform teeth, these commonly pale and somewhat cartilaginous, the stipules sometimes laciniate; leaves opposite, short-petiolate or sessile; inflorescence terminal; calyx segments almost free or variously united; corolla salverform or funnelform, the lobes valvate; fruit baccate, containing 2 one-seeded nutlets.—Probably no other species are known from Central America, but there is some uncertainty regarding division of the material into species.

Rudgea cornifolia (Humb. & Bonpl.) Standl. *R. fimbriata* Standl. Apparently frequent in forests of the region of San Ramón; mountains of Guanacaste; Río Naranjo; chiefly at 600–900 meters. Extending to Bolivia and Brazil, and probably to southern Mexico.

A glabrous shrub of 2–4 meters; stipules deltoid-ovate, incised-laciniate; leaves sessile or nearly so, elliptic to elliptic-oblong, 8–15 cm. long, acuminate, commonly narrowed to an obtuse or narrowly rounded base; inflorescence usually small, cymose-paniculate, broad, many-flowered, rather open, the flowers sessile or nearly so; calyx short, minutely 5-dentate; corolla white, 5–7 mm. long, the lobes longer than the tube; fruit ellipsoid, 5–8 mm. long (when fresh probably much larger), white. It is probable that *R. ceratopetala* Donn. Smith, described from Guatemala, is synonymous with *R. cornifolia.*

Rudgea Skutchii Standl., sp. nov.—Frutex 3-metralis omnino glaber, ramis gracilibus, novellis olivaceis plus minusve compressis, internodiis elongatis; stipulae diutius persistentes 7–8 mm. longae ovales coriaceae fere liberae apice obtusissimae et fasciculo setularum numerosarum brevium incrassatarum onustae; folia mediocria brevissime petiolata papyracea, petiolo 2–5 mm. longo; lamina elliptico-oblonga vel lanceolato-oblonga 8–10 cm. longa 3–4 cm. lata, subabrupte in acumen anguste longiattenuatum ad 2.5 cm. longum contracta, basin versus angustata, basi ipsa anguste obtusata, supra in sicco viridis, nervis pallidis, subtus fere concolor lucida, costa gracili elevata, nervis lateralibus utroque latere ca. 7 remotis prominentibus arcuatis prope marginem arcuato-conjunctis, venulis prominulis laxe reticulatis; inflorescentia terminalis graciliter 3.5–5 cm. longe pedunculata cymoso-paniculata, basi trichotoma, laxe pauciflora, ca. 3 cm. longa atque 5 cm. lata, ramis primariis angulo fere recto divergentibus gracilibus rigidis viridibus, cymulis paucis trifloris, flore centrali sessili, lateralibus ad 1 cm. longe pedicellatis, bracteis obsoletis; hypanthium obconicum 2 mm. longum, calyce viridi 3–3.5 mm. longo primo subtruncato serius irregulariter breviter lobato; corolla alba glabra, tubo crasso cylindraceo 5 mm. longo, lobis oblongis patentibus obtusis tubo fere aequilongis.—In forest, vicinity of El General, Prov. San José, 915 meters, *Alexander F. Skutch 2836* (type in U. S. Nat. Herb.; photo in herb. Field Mus.).

Rudgea thyrsiflora Donn. Smith, Bot. Gaz. 61: 375. 1916. Forests of Tsaki, Talamanca, 200 meters, *Tonduz 9579.* Collected also by Hoffmann (*No. 767*) at San Miguel. Endemic. Branches ferruginous-pubescent; stipules connate into a sheath, this bisetose on each side, aculeoliferous between the setae; leaves short-petiolate, thin, lance-elliptic, 19–23 cm. long, 6–8 cm. wide, narrowly long-acuminate, acute or acuminate at the base, glabrous; inflorescence thyrsiform, dense, ferruginous-pubescent, pedunculate, 5.5 cm. long, 1.5 cm. wide; calyx lobes ovate; corolla sparsely ferruginous-strigillose, the tube 2 mm. long, the lobes corniculate at the apex. I have not seen material of this species recently, and have available only a photograph of the type (which does not show the inflorescence) and a leaf from another collection. I am rather doubtful that the plant belongs to this genus.

RUSTIA Klotzsch

Glabrous shrubs or trees, the branchlets terete or obtusely tetragonous; leaves large, opposite, petiolate; stipules large, caducous; flowers in terminal panicles; hypanthium campanulate or turbinate; calyx short, 5-dentate or 5-lobate, persistent; corolla funnelform or campanulate, the throat glabrous or pilose, the 5 lobes valvate, short; ovary 2-celled, many-ovulate; capsule thick-coriaceous, oblong-ovoid or clavate, loculicidally bivalvate; seeds minute, horizontal.—Another species is known from Panama.

Rustia occidentalis (Benth.) Hemsl. Cocos Island. Nicaragua to Colombia; reported from Guatemala, but the report probably is based upon a Nicaraguan specimen. A glabrous shrub or small tree; stipules lance-triangular, 5–8 mm. long; petioles 1–2.5 cm. long, the blades oblanceolate, 10–19 cm. long, 2.5–5 cm. wide, acuminate to attenuate, attenuate to the base, subcoriaceous; panicles pedunculate, narrowly pyramidal, few-flowered, 6–9 cm. long, the pedicels 13 mm. long or less; calyx 1 mm. long, obscurely dentate; corolla salverform, pale violet, the tube 6–7 mm. long, the lobes ovate-oblong, obtuse, 5–6 mm. long; capsule rounded-obovoid, 1 cm. long, 5–8 mm. wide, dark brown. On Cocos Island the tree is reported to grow along streams, and to reach a height of 15 meters.

SABICEA Aubl.

Reference: Wernham, A monograph of the genus *Sabicea*, 1914.

Plants ligneous or suffrutescent, usually scandent, pubescent; leaves opposite; stipules persistent, erect or often reflexed; flowers usually small, capitate or cymose, axillary, bracteate; calyx 3–6-lobate, the lobes mostly narrow and elongate, persistent; corolla funnelform or salverform, the tube short or elongate, the throat villous, the 4–5 lobes short, valvate; stamens included; ovary commonly 4–5-celled, many-ovulate; fruit baccate, 2–5-celled, the numerous seeds minute, ovoid or angulate.—Perhaps two additional species occur in Central America.

Sabicea costaricensis Wernham, Monogr. Sabicea 31. 1914. Buenos Aires, in hedges, *Pittier 6712*. Occasional in thickets of the tierra caliente. Endemic(?). Suffrutescent, the young branches densely yellowish-sericeous; leaves petiolate, elliptic to oblong, 12 cm. long and 4.5 cm. wide or usually smaller, acuminate, obtuse to subcordate at the base, strigose beneath; inflorescence rather lax, 2 cm. broad or larger, the flowers conspicuously pedicellate; corolla sparsely strigose, the tube 8 mm. long, the lobes 2 mm. long; fruit greenish red.

Sabicea panamensis Wernham, described from Panama and reported also from Guatemala, is probably identical with *S. costaricensis.* Wernham described the former as an erect shrub, but all the Central American Sabiceas, as I have seen them, are elongate vines when well developed, and there is no reason to suppose that so closely related a plant is different in habit from *S. costaricensis.*

Sabicea villosa Roem. & Schult. *S. hirsuta* HBK. Thickets of the Atlantic tierra caliente. Widely distributed in tropical America. Similar in habit and general appearance to the preceding species; stems densely hirsute with spreading hairs; leaves 5–12 cm. long; flowers capitate, the heads sessile, few-flowered; corolla white, hirsute; fruit deep purple, about 1 cm. long, juicy.

Sabicea villosa var. **adpressa** (Wernham) Standl. Thickets of the tierra caliente; known from both coasts. Distributed like the typical form of the species. Distinguished by having the pubescence of the stems and corollas of closely appressed rather than spreading hairs.

SHERARDIA L.

Low annuals; leaves verticillate, narrow; flowers small, subsessile, in terminal and axillary, involucrate heads; calyx segments 4–6, persistent; corolla funnelform, the tube equaling or longer than the lobes; stamens exserted; fruit 2-celled, didymous, the carpels 1-seeded, indehiscent.—No species of the genus is native in America.

Sherardia arvensis L. Common in potreros on the upper slopes of Turrialba and Irazú, doubtless introduced with grass seed. Native of Europe. Stems hispidulous, short or elongate and branched; leaves in whorls of 4–6, obovate to lanceolate or linear, acute and mucronate, 6–15 mm. long, ciliate; flowers heads pedunculate; corolla pink or bluish. An inconspicuous plant, much like *Galium* in habit and general appearance.

SICKINGIA Willd.

Trees or shrubs; stipules often large; leaves opposite; flowers small or medium-sized, paniculate, 4–5-parted; calyx cupular or campanulate, truncate or dentate; corolla tubular or funnelform, usually pilose at the insertion of the stamens, the lobes short, imbricate or open in bud; stamens exserted; capsule usually globose, often very large, 2-celled, bivalvate; seeds large, horizontal, broadly winged. —Two other species, at least, occur in Central America. The trees have fine-grained wood that is pink or red when freshly cut, but the handsome color, unfortunately, disappears in age.

Sickingia Maxonii Standl. *Inkwood.* Collected only at Monte Verde, Atlantic tierra caliente, by Stork. Panama. A tree of 9–12 meters, with a spreading crown, the trunk 12–25 cm. in diameter; leaves very large, sometimes 60 cm. long and 40 cm. wide, but mostly smaller, sessile or short-petiolate, somewhat reddish when dried, obovate or rhombic-obovate, short-acuminate, narrowed to a rounded or subtruncate base, somewhat puberulent when young; inflorescence rather small and dense; corolla coriaceous, narrowly campanulate, 7–8 mm. long; fruit globose, the walls very thick and hard, about 6 cm. in diameter; seeds 1.5–2.5 cm. long. Called Inkwood by the English-speaking people of the Atlantic coast. Known in Panama as Guaiatil, Guaiatil colorado, and Jagua de montaña.

SOMMERA Schlecht.

Shrubs or small trees, more or less pubescent, the branchlets terete; leaves opposite, petiolate, membranaceous, conspicuously striolate-lineolate between the veins; stipules large, thin, caducous; flowers small, white, in axillary, pedunculate cymes, corymbs, or racemes; calyx 4–5-lobate, the lobes subfoliaceous, persistent; corolla funnelform or subcampanulate, sericeous, the throat villous, the 4–5 lobes short or elongate, valvate; ovary 2-celled, many-ovulate; fruit baccate, globose or ovoid; seeds numerous, minute, obtusely angulate.—One other species is found in Guatemala.

Sommera grandis (Bartl.) Standl. *S. Donnell-Smithii* Standl. Contr. U. S. Nat. Herb. 17: 436. 1914 (near Alajuelita, Prov. San José, 990 meters, *J. D. Smith 4771*). *S. mesochora* Standl. Frequent in mountain forests of the central region; Dota and San Ramón; chiefly at 1,000–1,600 meters, but collected also in the Changuinola Valley, at a much lower elevation. Panama to Mexico. A shrub or tree, sometimes 8 meters high, with a dense crown; stipules 1.5–3.5 cm. long; petioles 1–2.5 cm. long, the blades obovate to rhombic-obovate or oblanceolate-oblong, 10–20 cm. long, abruptly acuminate, rounded to attenuate at the base, minutely and sparsely appressed-pilose above, sparsely or densely pilose beneath with chiefly appressed hairs; inflorescences usually many-flowered, short-pedunculate, the pedicels 8 mm. long or less; calyx lobes suborbicular to ovate-oblong, rounded or obtuse, 2.5–4 mm. long; corolla white, sericeous, 5–8 mm. long; fruit subglobose, almost 1 cm. in diameter. Noteworthy for the fine striation of the leaf tissue.

SPERMACOCE L.

Erect or spreading annuals; stipules connate with the petioles to form a setiferous sheath; leaves opposite, herbaceous; flowers minute, densely fasciculate in the leaf axils, 4-parted; sepals short-connate; corolla funnelform, the lobes valvate; stamens attached at the base of the corolla tube, the anthers versatile; fruit dry, of 2 one-seeded carpels, these coherent at the base, one carpel opening, the other remaining closed.—At least two other species are found in Central America.

Spermacoce glabra Michx. Waste or brushy places about the Meseta Central, and in the Atlantic tierra caliente. Generally distributed in tropical America. Plants glabrous throughout or nearly so, erect or procumbent, rarely 60 cm. high; leaves short-petiolate, lanceolate or linear-lanceolate, 3–6 cm. long, acuminate; inflorescences many-flowered, one-sided; sepals triangular, 1 mm. long; corolla white, 2 mm. long; capsule 3 mm. long. One other species, *S. confusa* Rendle (*S. tenuior* of authors, not L.) is almost certainly to be found in Costa Rica, but I find no specimens or records. It is distinguished by having pubescent capsules, and the leaves are scabrous on the upper surface. Both species are inconspicuous weeds.

TOCOYENA Aubl.

Unarmed shrubs or small trees; stipules mostly caducous, glandular within; leaves opposite, petiolate; flowers large and showy, terminal, cymose, perfect, 4–6-parted; calyx cupular, dentate, glandular within; corolla funnelform or salverform, the tube slender and greatly elongate, glabrous or pubescent in the throat, the lobes contorted, obtuse or acute; fruit baccate, 2-celled, globose to oblong; seeds numerous, large, compressed, horizontal.—One other Central American species is native in Panama.

Tocoyena obliquinervia Standl. Contr. Arnold Arb. 5: 152. 1933. *Posoqueria obliquinervia* Standl. Journ. Wash. Acad. Sci. 18: 167. 1928. Forests of Río Naranjo, 200–250 meters, *Tonduz 9528*. Known only from the original material. Branchlets glabrous; petioles 1–1.5 cm. long, the blades cuneate-obovate to oblanceolate-oblong, 20–28 cm. long, 8–13 cm. wide, rounded and abruptly short-acute at the apex, cuneately long-attenuate to the base, short-barbate beneath in the axils of the nerves, otherwise glabrous; inflorescence terminal, corymbiform, dense, many-flowered, glabrous; calyx 2 mm. long, shallowly lobate; corolla tube (in bud) 12–18 mm. long, the limb in bud globose-ovoid, 7 mm. long, obtuse.

UNCARIA Schreb.

Scandent shrubs, glabrous or pubescent, climbing by means of stout, uncinate spines, these formed from abortive peduncles; leaves opposite, coriaceous, short-petiolate; stipules entire or bifid; flowers small, yellowish white, usually pubescent, in dense, globose heads, these axillary and solitary or paniculate; corolla tubular-funnelform, the 5 lobes valvate; ovary 2-celled, the ovules numerous; fruit capsular, elongate, septicidally bivalvate; seeds produced at each end into a wing.—A single species is native in Central America. The flower heads are similar to those of the related genus *Cephalanthus* found farther north, in Mexico and the United States.

Uncaria tomentosa (Willd.) DC. *Rangayo.* Thickets and swamps of the Atlantic tierra caliente. Guatemala to the Guianas. A large, woody vine; stipules 6–11 mm. long, obtuse or rounded; leaves oval or ovate-oval, 10–15 cm. long, obtuse-acuminate, rounded or cordate at the base, glabrous above, whitish-tomentose or glabrate beneath; heads 6 mm. in diameter (excluding the corollas); corolla 6 mm. long; capsule trigonous, 2–3 mm. long. The plant is a troublesome weed in banana plantations of the Atlantic coast.

WARSZEWICZIA Klotzsch

Trees or shrubs, more or less pubescent; stipules large, persistent; leaves opposite, petiolate, large, membranaceous or coriaceous; inflorescence terminal, the small flowers 5-parted, cymose, the cymes arranged in racemiform panicles; calyx lobes persistent, one of them dilated into a large, foliaceous, petiolate, bright-colored limb; corolla short-funnelform, villous in the throat, the lobes obtuse, imbricate in bud; anthers exserted; ovary 2-celled, many-ovulate; capsule small, oblong or globose, septicidally bivalvate; seeds minute, horizontal, marginate, reticulate.—A single species is found in North America.

Warszewiczia coccinea (Vahl) Klotzsch. Forests of the Atlantic tierra caliente. Extending to Peru and Brazil. A shrub or tree, sometimes 12 meters high; stipules 1.5–2 cm. long, narrowly triangular-oblong, acuminate or attenuate; petioles 2.5 cm. long or less, the blades oblanceolate-oblong to oval-obovate, mostly 20–50 cm. long, acute or short-acuminate, sparsely pubescent or almost glabrous; inflorescence 30–40 cm. long or larger, narrow; expanded calyx lobe with a bright red, oblong limb 3.5–7 cm. long; corolla yellow or orange, 5–8 mm. long; capsule 4–5 mm. long. This is one of the most showy and handsome plants of Costa Rica, but it is of apparently infrequent occurrence here.

XEROCOCCUS Oerst.

Low, simple shrubs; leaves opposite, large, petiolate; flowers numerous, forming large, dense, sessile heads in the leaf axils, the bracts and calyces dark red; calyx much exceeding the hypanthium, 4-lobate, the lobes linear-elongate, ciliate, persistent; corolla short, tubular, pubescent, the throat glabrous, the 4 lobes short, valvate; anthers included; ovary 2-celled, many-ovulate; fruit small, baccate, 2-celled, when dry separating into 2 cocci; seeds numerous, angulate, reticulate.—The genus consists of a single species.

Xerococcus congestus Oerst. Vid. Medd. Kjoebenhavn 52. 1852. Turrialba, 900 meters, *Oersted 11776* (photo. of type in Herb. Field Mus.). Frequent in mountain forests of the central region, mostly at 900–2,400 meters; region of San Ramón. Endemic. A simple shrub, sometimes as much as 3.5 meters high, but usually much lower, and often less than a meter in height; leaves long-petiolate, broadly ovate or elliptic, as much as 30 cm. long, sparsely villous or glabrate; flower clusters as much as 2.5 cm. in diameter, dark red; calyx lobes about 8 mm. long; corolla 8–10 mm. long; fruit white, 4 mm. long. When a part of the Rubiaceae of the *North American Flora* was published, in 1921, this plant was still known only from Oersted's type, and it is only in recent years that a considerable quantity of herbarium material has accumulated. In fact, only the writer seems to have had much success in finding the plant, although it grows abundantly in many forested areas throughout the central mountain region. It is such a showy and handsome plant that it is hard to understand how it could escape the attention of other collectors.

CAPRIFOLIACEAE. Honeysuckle Family

Shrubs or trees, sometimes woody vines; leaves opposite, simple or compound, entire or dentate, without stipules; flowers perfect, usually cymose; calyx tube adnate to the ovary, the limb 3–5-dentate or 3–5-lobate; corolla gamopetalous, usually white, the limb 5-lobate, sometimes bilabiate; stamens normally 5, inserted on the corolla tube alternate with the lobes, the anthers versatile; ovary inferior, 1–6-celled, the style slender, the stigma capitate or 2–5-lobate; fruit baccate or drupaceous in the Central American genera.—No other genera are known from Central America.

LONICERA L. Honeysuckle

Shrubs, erect or scandent; leaves entire, those of young shoots sometimes lobate; flowers variously arranged, often accompanied by large, leaflike bracts; corolla irregular, the limb more or less bilabiate; fruit baccate.—No species are native in Central America.

Lonicera japonica Thunb. *Madreselva.* A common ornamental plant of gardens. Native of eastern Asia. A slender vine with very fragrant flowers; corolla at first white or pink, soon turning yellow; berries black. The Japanese honeysuckle is a popular ornamental plant in most parts of Central America, especially above the tierra caliente.

SAMBUCUS L. Elder

Shrubs or small trees, the branches with abundant pith; leaves pinnate or bipinnate, the leaflets serrate or laciniate; flowers small, white, in usually depressed and broad cymes; calyx tube ovoid or turbinate, the limb dentate; corolla rotate or nearly so, regular, 3–5-lobate; ovary 3–5-celled; fruit small, drupaceous, berry-like, containing 3–5 one-seeded nutlets.—No other species are known from Central America.

Sambucus mexicana Presl. *Sauco.* Occasional in forest or hedges of the central region, chiefly at 900–1,600 meters; region of Dota; often seen in cultivation. Ranging northward to southwestern United States. Usually a shrub but often a tree as much as 6 meters high; leaflets mostly 5–7, oblong or lanceolate, acuminate, rather coarsely appressed-serrate, setulose-pilose beneath along the costa, otherwise generally glabrous or nearly so; flowers fragrant, in small and dense or broad and lax cymes; ripe fruit almost black. Most of the Central American specimens of this species are from cultivated plants, but this species is apparently native in some parts of Costa Rica. It is also planted, partly for ornament and partly for its flowers, whose infusion is much used in domestic medicine. The juicy, agreeably flavored fruits are edible, like those of other species of the genus. The typical form of *S. mexicana,* rare in Costa Rica, has pinnate leaves. The common form is var. *bipinnata*

(Schlecht. & Cham.) Schwerin, in which the lowest leaflets of each leaf are replaced each by 2 or 3 sessile leaflets.

Sambucus oreopola Donn. Smith, Bot. Gaz. 25: 146. 1898. *Sauco. S. canadensis* L. var. *oreopola* Rehder, Trees & Shrubs 2: 188. 1911. Forests of Rancho Flores, Volcán de Barba, *Tonduz 2107*. Frequent in forest or clearings on upper slopes of the central volcanoes, 1,800–2,400 meters; Zarcero. Endemic. A shrub, or sometimes a tree of 9 meters; bark light brown with green streaks, the wood pale yellow; leaflets 9–11, averaging larger than those of *S. mexicana* and much more finely and closely serrate, pubescent or almost completely glabrous; cymes very broad and rather lax; fruit red, becoming almost black. Both Rehder and Schwerin consider this merely a variety of *S. canadensis*, a common species of the United States. In a genus in which the species, for the most part, are so notoriously "feeble," it would seem that this Costa Rican plant, far removed from the nearest region in which true *S. canadensis* is known to occur, might well be given specific rank. Personally I believe that it has quite as good characters upon which to base such a separation as have most of the species maintained or described by the two authors mentioned.

VIBURNUM L.

Reference: C. V. Morton, The Mexican and Central American species of *Viburnum*, Contr. U. S. Nat. Herb. 26: 339–366. 1933.

Trees or shrubs; leaves entire or dentate; flowers small, white, cymose; calyx lobes 5; corolla campanulate or rotate, 5-lobate; ovary 1-celled, 1-ovulate; fruit a red or black drupe.—Other species occur in Central America.

Viburnum costaricanum (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 2. 1881. *Conchudo. Oreinotinus costaricanus* Oerst. Vid. Medd. Kjoebenhavn 1860: 290. 1861. Volcán de Irazú, 2,700 meters, *Oersted 7808*. Frequent in forests of the mountains, mostly at 1,100–3,000 meters. Adjacent Panama. A large shrub or a tree, sometimes 22 meters high, with a trunk 75 cm. in diameter, the bark scaly, rusty brown; leaves opposite or ternate, petiolate, elliptic to oblanceolate or obovate, 12 cm. long and 4.5 cm. wide or smaller, acute or acuminate, cuneate at the base, entire, glabrate above, sparsely stellate-pubescent beneath or glabrate; flowers sweet-scented; calyx tube glabrous, sparsely red-glandular; fruit black at maturity, 4–8 mm. long.

Viburnum stellato-tomentosum (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 3. 1881. *Tirrá, Curá, Surá. Oreinotinus stellato-tomentosus* Oerst. Vid. Medd. Kjoebenhavn 1860: 283. 1861. *O. Wendlandii* Oerst. loc. cit. (Volcán de Irazú, 2,600 meters, *Wendland 657*). *V. Wendlandii* Hemsl. loc. cit. *V. stellato-pilosum* Polak. Linnaea 41: 564. 1877 (forests near Barba, *Polakowsky 349*). Volcán de Irazú, 3,000 meters, *Oersted 7818*. Frequent in forest and thickets of the central region, chiefly at 1,000–2,700 meters. Adjacent Panama. A shrub or tree of 2–8 meters; leaves opposite, short-petiolate, ovate to elliptic or obovate, acute or short-acuminate, obtuse to rounded at the base, usually conspicuously dentate, densely stellate-tomentose; fruit black, 5–6 mm. long. The fruit, like that of other species, is sweet and edible.

Viburnum venustum Morton, Contr. U. S. Nat. Herb. 26: 350. 1933. Cerros de Zurquí, northeast of San Isidro, Prov. Heredia, 2,000–2,400 meters, *Standley & Valerio 50545*. Frequent in forest on the slopes of Barba and Poás; Palmira; at 1,500–2,600 meters. Endemic. A large shrub or a tree of 9 meters, the trunk to 15 cm. in diameter, the bark cinnamon-brown; leaves short-petiolate, ovate or broadly ovate, 15 cm. long or less, abruptly long-acuminate, rounded or truncate at the base, entire or rarely serrate, barbate beneath in the axils of the nerves, otherwise glabrous or nearly so; fruit ovoid, 6 mm. long, black. The wood is salmon-red when first cut.

VALERIANACEAE. Valerian Family

VALERIANA L.

Perennial herbs, sometimes scandent, the roots with a strong, distinctive odor; leaves opposite, simple or compound, without stipules; flowers small, paniculate or cymose, perfect or polygamo-dioecious; calyx limb represented by 5–15 setiform, plumose teeth; corolla gamopetalous, 5-lobulate; stamens usually 3; ovary inferior; fruit indehiscent, dry, compressed, 1-celled, 1-seeded.—Other species are native in northern Central America.

Valeriana Candolleana Gardner. *V. Mikaniae* Lindl. Common in forests and thickets of the temperate region, and in Guanacaste, at 600–1,800 meters; region of San Ramón. Mexico to Brazil. Stems elongate and scandent, glabrous; petioles long, the blades cordate, undulate-dentate, narrowly acuminate; flowers white or greenish. Some authors treat this plant as a mere variety of *V. scandens*, but it appears to be a perfectly good species.

Valeriana longifolia HBK. Thickets in the upper region of Volcán de Turrialba. Colombia. Plants erect, almost glabrous, as much as a meter high; leaves chiefly basal, linear or lanceolate, entire; flowers tinged with pink, arranged in a large, terminal panicle.

Valeriana prionophylla Standl., sp. nov.—Herba perennis erecta ut videtur simplex atque 1 m. alta vel ultra, caule subfistuloso 1 cm. crasso et ultra striato pallide viridi, internodiis valde elongatis bisulcatis, tantum in sulcis sparse setuloso-pilosis; folia basalia ca. 26 cm. longa lineari-oblonga, lamina 13–20 cm. longa 1.5–2.5 cm. lata obtusa vel acuta basin versus longiattenuata, grosse dentata, petiolis latis vaginantibus, foliis supra glabris, subtus sparse setuloso-pilosis; folia caulina 2–3 paria sessilia lineari-lanceolata 9–25 cm. longa plerumque 1.5–2 cm. lata, superiora basi paullo dilatata et subamplexicaulia, omnia versus apicem subobtusum angustata, grosse serrata vel saepe inciso-serrata; inflorescentia terminalis atque corymbosa longipedunculata ca. 15 cm. longa basi trichotoma, cymis longissime pedunculatis compactis saepe ex axillis foliorum superiorum nascentibus, floribus dense aggregatis sessilibus, bracteis lineari-lanceolatis usque 6 mm. longis, ramis saltem ad nodos dense albido-barbatis; corolla pallide violacea 2.5 mm. longa glabra, lobis tubo fere aequilongis subovalibus apice rotundatis; antherae breviter exsertae.—Cerro de La Muerte, 3,000 meters, in swampy places beside streams, June, 1932, *H. E. Stork 3040* (type in Herb. Field Mus.). Volcán de Irazú, 3,150 meters, northeastern slope, only a few plants observed among shrubbery, *Stork 2897.* The species is well marked, among Central American ones at least, by the very long and narrow, coarsely serrate or dentate leaves.

Valeriana scandens L. Reported from Atirro, and probably to be found in various parts of the tierra caliente. Widely distributed in tropical America. Plants scandent, glabrous; leaves compound, the 3 leaflets broadly ovate.

Valeriana scorpioides DC. Common in pastures and forests of the temperate region, 1,000–1,800 meters; region of San Ramón. Ranging to Mexico. Plants erect, perennial or annual, simple or sparsely branched, pubescent; leaves small, cordate-ovate, acute or obtuse, undulate or crenate; flowers very small, white.

Valeriana sorbifolia HBK. Occasional in forests of the central region; region of San Ramón; chiefly at 1,100–2,400 meters. Extending to Mexico. Plants erect, almost glabrous; leaves pinnate, the few leaflets serrate or dentate. It is possible that there may be referable to this species a collection from Cerro de Las Vueltas, at 3,000 meters, reported under the name *V. affinis* Mart. & Gal.

DIPSACACEAE. Teasel Family

All plants of the family are natives of the Old World.

SCABIOSA L.

Annual or perennial herbs; leaves opposite; flowers in pedunculate, involucrate heads; bracts of the involucre distinct or slightly united, herbaceous; flowers crowded upon a receptacle, this bearing small scales, or naked; calyx limb 5-dentate; limb of the corolla 4–5-cleft, oblique or bilabiate; stamens 4; fruit an achene, crowned by the persistent calyx.

Scabiosa atropurpurea L. *Bambalí.* *S. maritima* L. Often grown in gardens for ornament. Native of southern Europe. An erect annual, about 60 cm. high; basal leaves lance-ovate, lyrate-lobate and coarsely dentate; cauline leaves pinnate-parted, with narrow lobes; flowers dark purple, pink, or white. There are many horticultural forms of the plant, varying in color and size of the flowers.

CUCURBITACEAE. Gourd Family

References: Cogniaux in DC. Monogr. Phan. 3: 325–978. 1881; Pflanzenreich IV. 275, I, II. 1916–1924.

Herbaceous or very rarely woody vines, provided with coiled tendrils; leaves alternate, usually petiolate, often palmately lobate or dissected, without stipules; flowers monoecious or dioecious, small or large; calyx tube adnate to the ovary, the limb commonly 5-lobate, the petals normally 5, inserted on the limb of the calyx, distinct, or united to form a gamopetalous corolla; stamens mostly 3, sometimes 1, 2 of them with 2-celled anthers, the other with a 1-celled anther, the filaments short, often united; ovary 1–3-celled, the style terminal, simple or lobate; fruit a pepo, but very variable as to form, indehiscent or rarely dehiscent at the apex, sometimes dry; seeds usually compressed, without endosperm.—A few other genera are known from Central America. The family is still poorly understood in tropical America, chiefly because of the absence of adequate herbarium material. Large collections of well prepared specimens of the family are greatly to be desired.

ANGURIA L.

Reference: Cogniaux, Pflanzenreich IV. 275, I: 178. 1916.

Scandent herbs, glabrous or nearly so; leaves entire, lobate or composed of 3–5 leaflets; flowers usually dioecious, medium-sized, racemose or spicate, red or orange; receptacle elongate and narrow, the sepals short and dentiform; stamens 2, the anthers linear or oblong, straight or replicate, the connective narrow, usually produced as an appendage.—A few other species are known from Central America.

Anguria Dunlapii Standl. Field Mus. Bot. 4: 298. 1929. Type collected in the Changuinola Valley, Panama, but doubtless occurring also in Costa Rica. Plants glabrous; leaves ovate-oblong, shortly cuspidate-apiculate, shallowly cordate at the base; flowers 8 mm. long, forming a long-pedunculate head.

Anguria limonensis Pittier, Contr. U. S. Nat. Herb. 13: 119. *f. 25.* 1910. Between Limón and Moin, *Pittier 16112.* Forests and thickets of the Atlantic coast. Endemic. Leaflets 3, glabrous, ovate to lanceolate, acuminate, entire or somewhat sinuate, acuminate at the base; receptacle 8–10 mm. long; anthers straight, the appendage rounded and glabrous.

Anguria longipedunculata Cogn. Forests of the Atlantic coast. Mexico. Leaves broadly oblong, acuminate, rounded at the base, glabrous, entire or somewhat denticulate; flowers spicate, the receptacle 8–10 mm. long; anthers straight, the appendage narrow, papillose.

Anguria ovata Donn. Smith, Bot. Gaz. 31: 112. 1901. Las Vueltas, Tucurrique, 635 meters, *Tonduz 13006.* Also Río Yurquín. Endemic. Leaves broadly ovate, cuspidate-acuminate, rounded and shallowly retuse at the base, glabrous; flowers racemose, the pedicels 1–2 mm. long; receptacle 12–13 mm. long; anthers straight, the appendage glabrous.

Anguria pachyphylla Donn. Smith, Bot. Gaz. 54: 236. 1912. Tuis, Prov. Cartago, 650 meters, *Tonduz 11535.* Also at Las Vueltas. Endemic. Leaves almost orbicular, glabrous, deeply emarginate at the base, shallowly or deeply trilobate, the lobes acuminate, entire or undulate; flowers spicate, the receptacle 10–12 mm. long; anthers straight, the appendage narrow, obtuse, glabrous. The leaves are coriaceous; in the other species they are membranaceous.

Anguria plurilobata Cogn. Pflanzenreich IV. 275, I: 191. 1916. Río Tuis, 600 meters, *Tonduz 8175.* Stems somewhat pilose; leaves glabrous, pinnate-lobate, the 7–9 lobes triangular; flowers spicate, the receptacle 5–6 mm. long; anthers straight, obtuse and muticous. Easy of recognition because of the pinnate-lobate leaves.

Anguria Tonduzii Cogn. Pflanzenreich IV. 275, I: 191. 1916. Río Corozal, Santo Domingo, *Tonduz 1999.* Leaflets 3, glabrous, long-petiolulate, acuminate, narrowed to the base; flowers spicate, the receptacle 10 mm. long; anthers straight, obtuse and muticous.

Anguria Warscewiczii Hook. Frequent in forests of the tierra caliente; region of San Ramón, at 1,200 meters or less. Mexico to Venezuela. The species was based upon cultivated plants, probably of Costa Rican or Panaman origin. Leaves glabrous, the 3 leaflets petiolulate, acute or short-acuminate, entire or somewhat undulate or denticulate; flowers spicate, the receptacle 8–10 mm. long; anthers straight, the appendage narrow, glabrous. In some specimens there are found on the same branch trifoliolate leaves and others with simple, trilobate blades.

CAYAPONIA Manso

Scandent, more or less pubescent herbs; leaves commonly 3–7-lobate and rough; flowers monoecious, small or large, whitish, greenish, or yellowish, solitary, fasciculate, racemose, or paniculate; calyx of the staminate flower campanulate, with 5 teeth or lobes, the corolla campanulate or rotate; stamens 3, the anthers coherent; fruit globose or oval, indehiscent, 1–12-seeded.—A few other species are known from Central America.

Cayaponia americana (Lam.) Cogn. *C. americana* var. *Oerstedii* Cogn. in DC. Monogr. Phan. 3: 787. 1881 (Ujarrás, *Oersted 3312;* photo. of type in Herb. Field Mus.). Thickets and forests of the Atlantic tierra caliente. Nicaragua and West Indies. Leaves scabrous, 3–5-lobate, not decurrent at the base; flowers small, racemose or paniculate; calyx tube 12–18 mm. long, glabrous; fruit oval, 2.5–3.5 cm. long.

Cayaponia attenuata (Hook & Arn.) Cogn. Frequent in thickets of the tierra caliente. Mexico to Panama. Leaves scabrous, decurrent at the base, trilobate, the upper ones sometimes entire; flowers paniculate; calyx tube 8–10 mm. long, 1.5–2 cm. in diameter.

Cayaponia Austin-Smithii Standl., sp. nov.—Scandens, caulibus crassiusculis sulcatis dense breviter villosulis, internodiis elonga-

tis; folia 2–5 cm. longe petiolata trifoliolata crassa; foliola breviter petiolulata, terminalia obovato-oblonga acuminata, basi acuta vel attenuata, lateralia lanceolato-oblonga basi valde obliqua, omnia 5–12.5 cm. longa 1.5–6.5 cm. lata subdense serrato-denticulata, lateralia interdum prope basin subhastato-lobata, supra viridia aspero-scabra, subtus vix pallidiora ubique dense submolliter breviter pilosa; cirrhi elongati breviter pilosi; flores mediocres in racemos breves paucifloros dispositi, racemis saepe paniculas angustas subnudas elongatas efformantibus, pedicellis plerumque 3–4 mm. longis dense breviter pilosulis; calyx anguste campanulatus 5 mm. longus pilosulus vel scaber basi rotundatus, dentibus ovato-triangularibus acutis 2.5–3 mm. longis; corolla 8 mm. longa extus puberula, intus tomentosa; fructus juvenilis globosus glaber fere 1 cm. diam.—Zarcero, 1,350 meters, in forest, September, 1937, *Austin Smith A446* (type in Herb. Field Mus.). The collector's notes furnish the following information: A vigorous vine, climbing over trees to a height of 8 meters; leaves rather stiff and rough; flowers open-campanulate, 2.5 cm. broad, the corolla inside pale yellow, externally yellow-green, with deep green striations.

Cayaponia leucosticta Standl., sp. nov.—Herba elongata scandens, caulibus gracilibus sulcatis glabris, internodiis valde elongatis; folia valde variabilia papyracea petiolata, inferiora fere ad basin triloba, lobo terminali elliptico vel oblongo-elliptico, lateralibus valde obliquis, omnibus abrupte subcuspidato-acuminatis; folia superiora elobata vel saepe breviter subhastato-lobata, ovato-deltoidea, plerumque 6.5–12 cm. longa atque 4–8 cm. lata, subabrupte longe anguste caudato-acuminata, basi vulgo truncata, interdum breviter late cordata, remote denticulata vel integra, supra tactu laevis dense maculis magnis albis conspersa glabra, subtus epunctata glabra; flores solitarii vel breviter racemosi, pedicellis crassiusculis glabris usque 1.5 cm. longis, in statu fructifero incrassatis; calyx magnus globosus ca. 1 cm. longus et fere aequilatus glaber truncatus, margine dentibus 5 subulatis vix ultra 1 mm. longis patentibus onusto; corolla (in alabastro tantum visa) extus densissime brunneo-sordido-tomentosa; fructus ovalis glaber ca. 2.5 cm. longus atque 1.5 cm. diam.—La Palma de San Ramón, September, 1928, *Brenes 6336* (type in Herb. Field Mus.); also, from the same locality, *Nos. 6251, 6332, 6321, 5948.* Los Ayotes, near Tilarán, Guanacaste, 600 meters, wet forest, *Standley & Valerio 45439.*

Cayaponia macrantha Pittier, Contr. U. S. Nat. Herb. 13: 118. 1910. Las Vueltas de Tucurrique, Reventazón Valley, 635 meters,

Tonduz 12840. Known only from the original collection. Stems slightly puberulent at the nodes, otherwise glabrous; leaves long-petiolate, the blades ovate in outline, deeply trilobate, 7–12 cm. long, attenuate and subemarginate at the base, scabrous above, pale beneath and minutely white-punctate, remotely dentate, the lobes ovate-lanceolate, the lateral ones oblique, often bilobate; staminate flowers long-pedunculate, the peduncles 4–6 cm. long; calyx campanulate, 18 mm. long, villous, the teeth 3–5 mm. long; corolla yellowish white, 4 cm. long, lanate within; fruit globose, 5 cm. in diameter, yellow with green stripes.

Cayaponia microdonta Blake. Thickets at Pejivalle, Atlantic tierra caliente, 900 meters, and doubtless elsewhere. Ranging to British Honduras. A large or small, herbaceous vine, the slender branches rough; leaves long-petiolate, tuberculate and hispidulous or glabrate above, tuberculate, glanduliferous, and sparsely hispidulous beneath, trilobate to the middle or almost to the base, the lateral lobes again deeply lobate, the blade contracted and decurrent at the base, the lobes acute or acuminate, finely or coarsely dentate; calyx campanulate, 14 mm. long, the triangular teeth 1.5 mm. long; corolla cream-colored or greenish, 1.5 cm. long, viscid-puberulous; fruit globose, at maturity as much as 5 cm. in diameter.

Cayaponia racemosa (Swartz) Cogn. Frequent in thickets of the Meseta Central and on the Pacific slope; region of San Ramón; at 1,300 meters or less. Mexico to northern South America and West Indies. A large or small vine, the stems glabrous or nearly so; leaves petiolate, almost glabrous, or often very scabrous, mostly 3–5-lobate, abruptly long-decurrent at the base, the lobes obtuse or acute, dentate; calyx broadly campanulate, about 3 mm. long, rounded at the base, glabrous or nearly so, the teeth minute; corolla papillose outside, tomentose within, 4–5 mm. long; fruit oval, 16–18 mm. long, 8–10 mm. wide, glabrous. Var. *scaberrima* Cogn. in DC. Monogr. Phan. 3: 769. 1881, was based in part upon *Oersted 1* from San José and *Oersted 49* from Ujarrás.

CITRULLUS Forsk. Watermelon

The few species of the genus are natives of the Old World.

Citrullus vulgaris Schrad. *Sandía.* The watermelon, native of Africa, is grown commonly in Costa Rica, as in most warmer parts of America. The watermelons of the tierra caliente are often large and of superior quality, but many of those produced, especially on the Pacific slope during the dry season, are small and inferior, largely because inferior seeds are planted. There are numerous local varieties, differing in shape and in color of the flesh. Plants sometimes are found in waste places, where the seeds have fallen by accident, but such plants rarely if ever produce fruits.

CUCUMIS L.

Annuals or perennials, scandent or prostrate; tendrils simple; flowers yellow, mostly small, monoecious, the staminate fasciculate or rarely solitary, the pistillate usually solitary; staminate calyx campanulate or turbinate, the lobes subulate, remote, the corolla rotate or subcampanulate; stamens 3, free; fruit variable, usually fleshy and indehiscent, many-seeded; seeds ovate or oblong, compressed, smooth.—No other species are known in Central America.

Cucumis Anguria L. Thickets in the lowlands of Guanacaste, and perhaps elsewhere on the Pacific coast. Widely distributed in tropical America. Plants annual, prostrate, hispid; leaves long-petiolate, broadly ovate to rounded in outline, 5–10 cm. long, deeply 3–5-lobate, scabrous and hispidulous, very rough, the lobes mostly obovate; calyx 6 mm. long; corolla 1 cm. broad, the lobes ovate; fruit ellipsoid, yellow, 4–7 cm. long, densely covered with long, flexible prickles.

Cucumis Melo L. *Melón. Cantaloupe, Muskmelon.* Native of the Old World tropics, this well known plant, so generally cultivated in the United States, is seldom planted in Central America. I do not know whether its scarcity there results from dislike of the fruit or from difficulty in propagation.

Cucumis sativus L. *Pepino. Cucumber.* Grown commonly in gardens, as in most regions of the earth. Probably of East Indian origin.

CUCURBITA L.

Annual or perennial herbs, usually with rough pubescence; leaves cordate at the base; tendrils branched; flowers monoecious, large, yellow, the staminate solitary or fasciculate, the pistillate solitary; calyx campanulate, 5-lobate; corolla campanulate, 5-lobate to the middle; stamens 3, distinct, the anther sacs flexuous; fruit large, fleshy, indehiscent.—No species are native in Central America, but one or more are found in Mexico.

Cucurbita ficifolia Bouché. *Chiverre, Chilacayote* (*Pittier*). Planted commonly in the temperate regions, especially at rather high elevations; naturalized in thickets and forest in the region of Dota. Probably native of tropical Asia. A large, scandent vine, perennial; leaves subreniform, usually deeply 5-lobate but often only shallowly lobate, the lobes broadly rounded; calyx villous-hirsute, the lobes linear, slightly shorter than the tube; corolla 6–8 cm. long; fruit globose-ovoid, 20–30 cm. in diameter or larger, pale green, with white, fibrous flesh. The *chiverre* is one of the well known cultivated plants of Costa Rica, and often figures in literature, or especially in jokes. Often when one has made a long and hard trip on horseback to some finca high in the mountains, the owner welcomes his guest with a promise, in appreciation of his visit, to give him a *chiverre* when he returns home. The fruit looks much like a watermelon. Its flesh is used for preparing a variety of desserts.

Cucurbita Pepo L. *Ayote, Sapayo.* A large number of varieties of squashes are grown in Costa Rica, as in other parts of Central America, and they constitute one of the favorite vegetables, being prepared for the table in various ways. These plants are of American origin, but they are no longer found in a wild state, an indication that their cultivation must be very ancient. Pumpkins like those grown in the United States I have never seen in Central America, most of the forms being rather of the squash type. The name *ayote* is of Mexican origin; *sapayo* is said by Pittier to be of Quechua derivation. Indigenous names reported by Pittier are: Pis (Cabécara); Apí (Bribrí); Bat (Brunka).

CYCLANTHERA Schrad.

Reference: Pittier, Contr. U. S. Nat. Herb. 13: 120. 1910.

Scandent herbs, usually glabrous or nearly so; tendrils simple or branched; leaves angulate to pedately compound; flowers usually very small, yellowish or white, monoecious, the staminate racemose or paniculate; calyx tube cupular or subrotate, the 5 teeth subulate, sometimes obsolete; corolla rotate, deeply 5-parted, the lobes generally acute; stamens coalescent to form a column, the anthers connate into a head, usually 1-celled and annular; pistillate flowers solitary, inserted in the same axil with the staminate inflorescence; fruit obliquely ovoid, gibbous, fleshy, usually echinate, containing 1 or more seeds.—A few other species probably occur in Central America. The young fruits of some species, known in Costa Rica as Caífas, often are cooked and eaten. The young shoots or *quelites* also are used as a vegetable.

Cyclanthera explodens Naud. *Chanchitos* (fruits). *C. costaricensis* Cogn. Diagn. Cucurb. 2: 73. 1877 (San José, *Oersted 23;* photo. of type in Herb. Field Mus.). *C. costaricensis* var. *angustiloba* Cogn. loc. cit. (Ujarrás, 1,000 meters, *Oersted 24*). Thickets of the Meseta Central, chiefly at 1,100–1,300 meters; region of Dota. Salvador to Ecuador. Stems more or less villous, at least at the nodes; leaves short-petiolate, the upper ones often almost sessile, 6–9 cm. long, shallowly or deeply trilobate, acuminate, shallowly or deeply cordate at the base, remotely denticulate, scaberulous-pubescent on both sides; staminate racemes usually short, the calyx tube glabrous, scarcely more than 1 mm. broad; corolla 1 mm. long; fruits on very short peduncles, usually 8-seeded, 2–2.5 cm. long, somewhat glaucous, bearing a few short, thick, fleshy spines. The ripe fruits dehisce elastically when squeezed in the hand. Cogniaux and Pittier both maintained *C. costaricensis* as a distinct species, but the key characters are extremely feeble, and a photograph of the type specimen shows that it is exactly like the Costa Rican collections cited by Pittier under *C. explodens.*

Cyclanthera Langaei Cogn. Frequent in thickets and forest of the tierra caliente, ascending the slopes of the mountains to 3,000 meters. Ranging to Mexico. A slender, much branched vine, the stems villous at the nodes, elsewhere glabrous; leaves long-petiolate, 5–7-foliolate, the leaflets lanceolate or linear-lanceolate, 5–10 cm. long or even larger, acutely dentate, acute, sparsely villous or glabrate; staminate racemes long-pedunculate, the pedicels filiform; calyx tube 3 mm. long; corolla white, 2–2.5 mm. long; fruits ovoid or oblong, 2.5–3 cm. long, short-rostrate, densely aculeate, the peduncles 3–6 cm. long. *C. Langaei* subsp. *gracillima* Pittier (Contr. U. S. Nat. Herb. 13: 124. 1910; hedges at Ochomogo, 1,500 meters, *Tonduz 10904*) is a form with large leaves and very slender stems.

Cyclanthera Naudiniana Cogn. Slopes of Volcán de Barba, and region of Zarcero, 2,000–2,300 meters, in forest. Panama to Texas. Stems slender, glabrous; leaflets 3–5, usually petiolulate, lanceolate or oblong, mostly 3–5 cm. long, acuminate, dentate or lobulate, almost glabrous; staminate racemes or panicles sometimes longer than the leaves, the calyx tube 2 mm. broad; corolla green, 1.5–2 mm. long; fruiting peduncles 1–2 cm. long; fruit ovoid-oblong, 2–2.5 cm. long, densely short-setose.

Cyclanthera pedata Schrad. *Caïfa, Pepino.* Region of Cartago, but perhaps only in cultivation for its edible fruits. Mexico to

Bolivia. Stems glabrous; leaflets 5–7, sessile or nearly so, lanceolate or oblong-lanceolate, 7–15 cm. long, acute, attenuate to the base, denticulate or crenulate, somewhat scaberulous; staminate inflorescences paniculate, 10–20 cm. long, the pedicels filiform; calyx glabrous, the tube 3–4 mm. broad; corolla 1.5–2 mm. long; fruits oblong-lanceolate, 5–10 cm. long, long-attenuate, bearing a few short, fleshy spines toward the base, the peduncle very short and thick. Illustrated by Pittier, Contr. U. S. Nat. Herb. 13: *pl. 18.*

Cyclanthera Tonduzii Cogn. Bull. Soc. Bot. Belg. 30, pt. 1: 274. 1892. Hedges near San José, *Pittier 1449.* In thickets or forest, Meseta Central and the Pacific slope; Guanacaste; region of San Ramón; Dota; at 2,400 meters or less. Reported also from Guatemala. Plants slender and much branched, the stems puberulent at the nodes, otherwise glabrous; leaflets 5, scaberulous above, glabrous beneath, 4–12 cm. long, obtuse or acute, dentate and often lobate; staminate inflorescences slender, usually longer than the leaves, the calyx glabrous, 3 mm. broad; corolla white, 2 mm. long; fruiting peduncles 2–3 cm. long; fruits 2–2.5 cm. long, 1–1.5 cm. thick, densely setose. Illustrated by Pittier, Contr. U. S. Nat. Herb 13: *f. 27, 28.*

ECHINOCYSTIS Torr. & Gray

Scandent herbs, annual or perennial; leaves long-petiolate, usually 5–7-angulate or lobate; tendrils 2–5-fid; flowers usually small and white, the staminate racemose or paniculate; calyx tube campanulate, the 5 teeth subulate; corolla commonly rotate, deeply 5-parted, the segments oblong or linear, papillose; stamens 3, the filaments united to form a column, the anthers connate or free, the cells flexuous; pistillate flowers solitary or arising from the same axil as the staminate; fruit dry, 1–3-celled, densely covered with long and rather stout spines, opening at the apex by 1–2 pores, sometimes irregularly rupturing.—Probably no other species occur in Central America.

Echinocystis Coulteri (Gray) Cogn. *Tacaquillo, Chayotillo. Echinopepon horridus* Naud. Thickets or forest of the Meseta Central, chiefly at 1,000–1,200 meters. Extending to Mexico. A slender, much branched vine, the stems sparsely villous-hirsute; leaves angulate or shallowly 5-lobate, mostly 8–10 cm. long, acute or short-acuminate, deeply cordate at the base, sparsely villous-hirsute, remotely and minutely denticulate; staminate racemes longer than the leaves, 5–15-flowered, the pedicels 5–9 mm. long; calyx sparsely villous, 7–8 mm. broad, the narrowly triangular teeth 2 mm. long; corolla sparsely villous, 6–7 mm. long; fruit oblong, 4 cm. long, 2 cm. broad, long-rostrate, the spines 4–18 mm. long.

ELATERIOPSIS Ernst

Similar to *Cyclanthera,* but the stamens 5, the anthers connate into a head, the anther cells flexuous; in *Cyclanthera* there is a single anther; fruit smooth, unarmed.—No other species are known from Central America.

Elateriopsis Oerstedii (Cogn.) Pittier, Contr. U. S. Nat. Herb. 13: 125. *pl. 19; f. 31-34.* 1910. *Caifa, Chayotillo. Cyclanthera Oerstedii* Cogn. in DC. Monogr. Phan. 3: 856. 1881. San José, *Oersted 20* (photo. of *Oersted 18,* from Cerro de Catalina, one of the other specimens cited by Cogniaux, in Herb. Field Mus.). In thickets and forest, Meseta Central to the coasts, at 1,300 meters or less; Guanacaste. Endemic. Stems rather stout, 5-sulcate, glabrous or slightly pubescent; leaves long-petiolate, the petioles glabrous; blades 6–15 cm. long, angulate or shallowly trilobate, almost glabrous, punctate above, cordate at the base, remotely denticulate; staminate racemes 5–20 cm. long, the pedicels 1–2 cm. long; calyx sparsely pubescent, 6–7 mm. broad, the teeth subulate; corolla greenish white, pubescent outside, 5–6 mm. long; fruiting peduncles 2–3 cm. long; fruit obliquely ovoid, 6–8 cm. long, 3–4 cm. thick, smooth, light green with darker stripes, 3-celled, the seeds several in each cell, flattened, brownish, 17 mm. long. *E. Oerstedii* var. *Biolleyi* Pittier (Contr. U. S. Nat. Herb. 13: 126. *f. 31.* 1910; *Cyclanthera Oerstedii* var. *Biolleyi* Cogn., ined.) is a form with slightly larger flowers, the corolla lobes being longer and narrower than in the type. The fruits are a rather common vegetable of central Costa Rica, and the plants are often cultivated.

ELATERIUM Jacq.

Slender, scandent herbs, glabrous or rather sparsely pubescent; leaves cordate, entire, lobate, or parted; tendrils simple or branched; flowers small, white or yellow, monoecious, the pedicels capillary; staminate flowers racemose, the calyx tube elongate-cylindric, narrow, the usually 5 lobes subulate or filiform, the corolla rotate, parted almost to the base; filaments connate into an elongate column, the anther cells linear, sigmoid-flexuous; pistillate flowers solitary; fruit obliquely ovoid, rostrate, gibbous, fleshy, 1–many-celled, at maturity rupturing elastically; seeds marginate, the margin usually crenulate. —One or two additional species are found in Central America.

Elaterium ciliatum Cogn. *Chanchitos* (fruits). Frequent in thickets and forest, Meseta Central to the Pacific tierra caliente; region of San Ramón; at 1,300 meters or less. Panama to Guatemala. Leaves thin, the upper ones sessile or nearly so, mostly ovate-cordate or rounded and 6–8 cm. long, somewhat angulate and remotely dentate, sparsely and rather softly pilose, the basal sinus densely ciliate with long, white hairs; tendrils branched; flowers green, the calyx nearly or quite 2 cm. long; petals linear, 12–15 mm. long; fruit at first setose, 2–2.5 cm. long. The young and tender fruits sometimes are cooked and eaten. The ripe fruits, if taken in the hand and pressed gently, explode and wriggle in one's hand like a caterpillar, in much the same fashion as the seed pods of *Impatiens*. These properties are well known in Central America, where the children delight in picking the fruits.

Elaterium gracile (Hook. & Arn.) Cogn. *Chanchitos*. Common in thickets and forest, Meseta Central to the Pacific coast; region of San Ramón; at 1,300 meters or less. Mexico to Venezuela and Ecuador. Similar to the preceding species, but the leaves not ciliate in the basal sinus.

Elaterium pauciflorum Cogn. Bull. Soc. Bot. Belg. 30, pt. 1: 276. 1891. Piedra del Convento, *Pittier 3907*. Known only from the original material. Tendrils simple, rather than branched as in the preceding species; staminate racemes only 2–3-flowered.

FEVILLEA L.

Scandent vines, the leaves thin, angulate or lobate, the flowers small, paniculate, dioecious; calyx and corolla similar in both kinds of flowers, the calyx 5-lobate, the corolla divided into separate petals; stamens 5, accompanied by 5 staminodia, the anthers 1-celled; ovary completely 3-celled; fruit very large, imperfectly 3-celled, the seeds large, compressed.—A single species is found in Central America.

Fevillea cordifolia L. *Cabalonga, Chichimora, Contraveneno.* I have seen no Costa Rican material, but the plant is reported from the tierra caliente. Widely distributed in tropical America. Stems stout, glabrous; leaves long-petiolate, broadly oval to ovate-oblong, 8–15 cm. long, entire or lobate, short-acuminate, subcordate at the base, 5-nerved; staminate panicles large, many-flowered, the calyx 2–3 mm. long, the lobes ovate, rounded at the apex; petals yellow or brown, 3–4 mm. long, orbicular-ovate; fruit globose, about 10 cm. in diameter, green and lustrous; seeds 12, brown, very large. The handsome and distinctive seeds often are displayed for sale by the *curanderos* who frequent the markets. The seeds have a high reputation throughout Central America as a cure for various diseases. Pittier reports the Brunka name as Srán-ua.

FRANTZIA Pittier

Scandent herbs, almost glabrous; leaves entire or deeply lobate; flowers small, whitish or yellowish; staminate inflorescence racemose; calyx subrotate, the 5 teeth thick, rounded; corolla lobes 5, spreading, ovate-lanceolate; stamens 5, the filaments connate to form a column, the anthers forming an irregular head; pistillate flowers solitary, in the same axils with the staminate inflorescence; ovary 1-celled, 1-ovulate; fruit fibrous or ligneous, ovate-rounded, somewhat aculeate, indehiscent; seed ovate, smooth.—The genus consists of only the following species. It was named for Alexander von Frantzius, investigator of the fauna and physiography of Costa Rica.

Frantzia montana Pittier, Contr. U. S. Nat. Herb. 13: 128. *f. 35, 36.* 1910. Climbing on old trunks in pastures on the slopes of Volcán de Turrialba, 2,500 meters, *Pittier 13192.* Also in the region of El Copey, 1,800 meters. Endemic. Stems glabrous; leaves long-petiolate, 8–10 cm. long, thick, white-punctate above, almost glabrous, paler beneath and rather densely glandular and hispidulous, 3-lobate almost to the base, the lobes narrow, long-acuminate, the outer ones hastate at the base; staminate inflorescence 15–25 cm. long, the filiform pedicels 3–5 mm. long; calyx 4 mm. broad, sparsely short-pilose; corolla pale yellow, sparsely brownish-pilose outside, the lobes 3.5 mm. long; fruit ovoid, 4.5 cm. long, 3 cm. broad, sparsely beset with short, hard spines; seed compressed, smooth, 2 cm. long, 1 cm. broad.

Frantzia Pittieri (Cogn.) Pittier, Contr. U. S. Nat. Herb. 13: 129. *f. 37-39.* 1910. *Chayotillo, Tacá, Tacaco. Cyclanthera Pittieri* Cogn. Bull. Soc. Bot. Belg. 30, pt. 1: 275. 1891. *Elateriopsis Pittieri* Cufodontis, Archivio Bot. 10: 50. 1934. Carrillo, Río Sucio Valley, 300 meters, *Pittier 1212.* Apparently frequent in forests of the Atlantic tierra caliente; region of Zarcero; ascending to 1,800 meters. Endemic. Plants glabrous throughout; leaves about 10 cm. long, entire or shallowly trilobate, deep green above, pale beneath, deeply cordate at the base, acuminate, the lobes remotely denticulate or subentire; staminate inflorescence 10–25 cm. long, the filiform pedicels 3–7 mm. long; calyx 5 mm. broad; corolla 1 cm. in diameter, green; fruit 4–6 cm. long, 3–4 cm. broad, with short, hard spines throughout or only at the base; peduncle 3–5 cm. long. *F. Pittieri* var. *quinqueloba* (Cogn.) Pittier (Contr. U. S. Nat. Herb. 13: 130. 1910; *Cyclanthera Pittieri* var. *quinqueloba* Cogn. Bull. Soc. Bot. Belg. 30, pt. 1: 276. 1891; Boruca, *Pittier 3506*) is a form with the leaves deeply 3–5-lobate, the lobes being narrower and more narrowly acuminate than in the typical form. The fruits are much like those of *Polakowskia.* They have an odor resembling that of cucumber.

GURANIA Cogn.

Reference: Cogniaux, Pflanzenreich IV. 275, I: 192. 1916.

Scandent herbs, sometimes with woody stems, pilose; leaves entire or lobate; flowers small or medium-sized, the calyx red or orange, the petals small, yellow; flowers dioecious, the staminate spicate, capitate, or racemose, the sepals elongate and very narrow; stamens 2, the anthers narrow or broad, usually appendiculate; fruit oblong, containing many compressed seeds.—Other species are known from Central America.

Gurania costaricensis Cogn. Diagn. Cucurb. 1: 37. 1876; Pflanzenreich 275, I: *f. 50.* Type collected by Warscewicz, without indication of the locality (photo. in Herb. Field Mus.). Forests of the Atlantic tierra caliente, ascending to 1,350 meters. Endemic. A large, scandent herb, the stems hirsute; leaves short-petiolate, ovate-cordate or oblong-cordate, acuminate, dentate, pilose; staminate flowers pedicellate and umbellate, the sepals 7–9 mm. long, the receptacle sericeous-pilose. Var. *subtrilobata* Cogn. op. cit. 38, the type collected by Oersted (*No. 7*), differs in having somewhat trilobate leaves. In this as in other species the flowers are handsome and very conspicuous because of their brilliant colors, especially when the plants grow in places where there are few other plants that produce brilliant flowers.

Gurania Levyana Cogn. Common in the tierra caliente, ascending to the Meseta Central; Guanacaste; region of San Ramón; at 1,300 meters or less. Nicaragua to Panama. A large vine, the stems short-pilose and rough; leaves long-petiolate, broad, usually trilobate, the lobes obtuse or acuminate, denticulate; staminate flowers disposed in a long-pedunculate head; sepals linear, pilose, 3–4 cm. long, the receptacle tomentose; connective of the anther broad, prolonged into a papillose appendage, the anther oblong, replicate at the base.

Gurania Makoyana (Lam.) Cogn. Frequent in forests of the Atlantic tierra caliente, ascending to Juan Viñas. Guatemala to

Panama. Stems short-villous; leaves deeply trilobate, sometimes 5-lobate, soft-pilose, the lobes narrow, remotely denticulate; staminate flowers in dense, long-pedunculate heads; sepals narrowly linear, about 3 cm. long, the receptacle densely tomentose; anthers oblong, replicate at the base, the connective narrow, prolonged into a glabrous appendage.

Gurania megistantha Donn. Smith, Bot. Gaz. 33: 251. 1902. Suerre, Llanuras de Santa Clara, 300 meters, *J. D. Smith 6649*. Also at Talamanca and Pejivalle; ascending to 900 meters. Panama. A woody vine, the stems as much as 7 cm. thick, covered with a thick, corky bark, the wood small, with extremely large vessels, the stems climbing to the tops of tall trees; leaves unknown; staminate flowers racemose; receptacles glabrous, the sepals 8 mm. long, the whole flower as much as 4 cm. long. Easy to recognize by the form of the flower, with a long, narrow, glabrous receptacle. This plant is perhaps the only Costa Rican member of the Cucurbitaceae with truly woody stems.

Gurania racemifera Standl., sp. nov.—Caulis scandens herbaceus dense longihirsutus; folia profunde triloba basi breviter cordata utrinque sparse hirsuta, petiolo dense hirsuto, lobis oblongis breviter abrupte acuminatis fere integris, lateralibus paullo latioribus; flores masculi racemosi, racemis dense multifloris ad 5 cm. longis longipedunculatis, pedicellis incrassatis 4–7 mm. longis glabris vel sparse hirsutis; receptaculum ovoideum 5 mm. longum pilis paucis longis laxis albis onustum, sepalis lineari-attenuatis erectis 4 mm. longis sparse hirsutis; corollae segmenta linearia sepalis paullo breviora attenuata; antherae ovatae rectae, connectivo angusto, appendice anguste triangulari papilloso.—Moist forest, Naranjos Agrios, Prov. Guanacaste, 600 meters, *Standley & Valerio 43508* (type in U. S. Nat. Herb.). Flowers orange. Easy of recognition among Costa Rican species by its racemose, very small flowers.

Gurania Pittieri Cogn. Pflanzenreich IV. 275, I: 198. 1916. Forests of Tsaki, Talamanca, 200 meters, *Tonduz 9589*. Stems densely short-pubescent; leaves deeply trilobate, sparsely pilose, the lobes acuminate, remotely denticulate; staminate flowers forming a dense head; receptacle ovoid, short-villous, the sepals narrowly linear, 14 mm. long; anthers broad, replicate at the base, the connective broad, not produced at the apex.

Gurania Seemanniana Cogn. Frequent in forests of the Atlantic tierra caliente, ascending to 1,500 meters. Honduras to

Panama. Stems villous with long, soft hairs; leaves 5–7-lobate, pilose, the lobes broad or narrow, acuminate, denticulate; staminate flowers forming dense heads; receptacle densely white-tomentose, the sepals pilose, very narrow, 2 cm. long; anthers replicate at the base, the connective narrow, prolonged as a pilose appendage.

Gurania Tonduziana Donn. Smith, Bot. Gaz. 31: 112. 1901. Shirores, Talamanca, 100 meters, *Tonduz 9332*. Stems pubescent; leaves deeply 7-parted, pubescent, the lobes very narrow, acuminate, remotely denticulate; staminate flowers densely capitate; receptacle densely short-pubescent, the sepals narrowly linear, 2.5 cm. long; anthers oblong, replicate at the base, the connective narrow, produced into a glabrous appendage.

LAGENARIA Seringe

Large, scandent herbs; flowers large, white, monoecious, solitary; staminate calyx almost funnelform, the corolla of 5 distinct, spreading petals; stamens 3, distinct, the anther sacs flexuous; fruit large, indehiscent, dry or nearly so, with a hard, brittle shell; seeds white, obovate, marginate.—The genus consists of a single species.

Lagenaria siceraria (Molina) Standl. *Calabaza.* Cultivated commonly in temperate and lowland regions. Probably native in the tropics of the Old World. Plants softly and finely pubescent; leaves large, long-petiolate, reniform-cordate, denticulate, rarely lobate; petals crispate, 3–4 cm. long; staminate calyx 2–3 cm. long. The hard-shelled gourds or calabashes borne by this plant are of importance in the household economy of rural regions. They are used as containers for all sorts of substances, and for fashioning ladles, spoons, and other articles for kitchen use. The fruits, according to Pittier, fall into three classes, as regards form: large and globose, called *nambiro* in Nicoya; elongate and sausage-shaped, known as *calabaza dulce;* and the most common, bottle-shaped. The second form is used particularly for fashioning the sounding-boxes of marimbas. The young and tender fruits of this vine are cooked and eaten as a vegetable in some regions. Indian names listed by Pittier are: Deka (Cabécara), Dshiún, Iún-kra, Io-krá (Brunka), Igúg (Térraba).

LUFFA Adans.

Annual vines, usually scandent, with broad leaves and branched tendrils; flowers bright yellow, the staminate racemose, the pistillate solitary; staminate calyx 5-lobate, the 5 petals distinct; stamens 3, distinct, the anther cells linear, flexuous; fruit dry, 3-celled, fibrous within, cylindric or oblong, many-seeded, opening at the apex by an operculum.—One other species is known to occur in Central America.

Luffa cylindrica (L.) Roem. *Estopa, Paste.* Often planted about the Meseta Central and in the tierra caliente, and frequently wild in thickets. Native of the Old World tropics, but widely naturalized in America. A large vine with glabrous stems; leaves long-petiolate, rounded-ovate, as much as 25 cm. wide, deeply cordate at the base, scabrous, lobate and sinuate-dentate, the lobes triangular, acute; staminate flowers racemose at the end of a long peduncle, 10–20 in a raceme, the pedicels 2 cm. long; petals 2–3 cm. long; fruit cylindric or fusiform, 10–30 cm. long, smooth, ecostate. The mass of fiber that fills the interior of the fruit looks much like a sponge, and is used locally for the same purposes. The tender young fruits sometimes are cooked and eaten.

Luffa operculata (L.) Cogn. Reported by Cogniaux from Costa Rica, on the basis of an Oersted collection, without locality; the record is doubtful, but the plant is to be expected in Costa Rica. Mexico to Brazil. Similar to the preceding species, but the fruits much smaller, about as large as a hen's egg, 10-costate, spinose-tuberculate along the ribs; petals 1 cm. long.

MELOTHRIA L.

Reference: Cogniaux, Pflanzenreich IV. 275, I: 75. 1916.

Slender, usually scandent vines; tendrils simple or rarely bifid; leaves small, thin, angulate or lobate; flowers very small, white or yellow, monoecious, the staminate fasciculate, the pistillate often solitary; calyx campanulate, 5-dentate; corolla campanulate, deeply 5-lobate; stamens 3, the anthers distinct or slightly united, their cells not flexuous; fruit small, resembling a small melon or cucumber, fleshy, smooth, indehiscent.—One or two additional species are native in Central America.

Melothria guadalupensis (Spreng.) Cogn. *Chiverrillo. M. fluminensis* Gardn. Frequent in the tierra caliente, ascending to the Meseta Central, and even to higher elevations in the mountains; region of San Ramón; at 1,500 meters or less, growing in forest or thickets. Mexico to West Indies and Venezuela. A small, slender vine, scandent or often prostrate, much branched, the branches glabrous; leaves slender-petiolate, ovate-cordate or triangular-subsagittate, 6–10 cm. long, acute or short-acuminate, entire or shallowly 3–5-lobate, the margin undulate or remotely dentate, scabrous; staminate peduncles 2–6-flowered, the pedicels 2–3 mm. long, the calyx tube 2.5 mm. long; corolla 3–4 mm. broad; fruit oval, about 1.5 cm. long and 1 cm. thick.

Melothria scabra Naud. Thickets and forest of the Atlantic tierra caliente, and in Guanacaste. Panama to Mexico. Leaves rather stiff, ovate-oblong to triangular-subsagittate, 5–10 cm. long, acute or short-acuminate, subentire or 5-lobate, remotely denticulate, very scabrous, short-hirsute beneath on the nerves; staminate peduncles 5–7-flowered, the pedicels 1–3 mm. long; calyx tube 3 mm. long; corolla 5 mm. broad; fruit 2.5 cm. long, 1.5 cm. thick. In this species the anthers are about as broad as long; in *M. guadalupensis* they are much longer than broad.

Melothria trilobata Cogn. *M. trilobata* var. *costaricensis* Cogn. Pflanzenreich IV. 275, I: 81. 1916 (Río Zhorquín, 50 meters, *Tonduz 8504*). Changuinola Valley. Ranging to Surinam. Plants coarser than in the other species; leaves 3–5-lobate almost to the base, scabrous; calyx tube 3–4 mm. long; corolla villous; fruit 4–5 cm. long, 2.5–3 cm. thick, pale green, striped with dark green.

MICROSECHIUM Naud.

Scandent herbs, somewhat puberulent or villous-hirsute, perennial; tendrils 3–6-fid; leaves petiolate, large and broad, thin, cordate at the base, usually 3–5-lobate; flowers small, monoecious, the staminate racemose; calyx tube broadly campanulate, the 4 teeth subulate; petals triangular-ovate; stamens 4, the filaments connate into a column, the anthers free, 2-celled, the cells flexuous; pistillate flowers capitate-umbellulate, 3-parted; fruit fleshy, indehiscent, very small, sparsely spinulose, 1-seeded.—One other species has been described from Guatemala, but its generic status is uncertain.

Microsechium Helleri (Peyr.) Cogn. In forest, region of Zarcero, 1,650 meters; material from Dota and Pejivalle also may be referable here; Oersted specimens, without locality, cited by Cogniaux, probably were collected in Costa Rica. Ranging to Mexico. Plants slender, much branched, the stems glabrous or puberulent; leaves long-petiolate, bright green, commonly shallowly 3–5-lobate, sparsely short-hirsute above, punctate-scaberulous in age, sparsely short-villous-hirsute beneath, denticulate, mostly 8–15 cm. long, the lobes subacute to acuminate; staminate inflorescence 10–30-flowered, the pedicels filiform; calyx sparsely pilose, 4 mm. broad or less; corolla 8–11 mm. broad, white; pistillate peduncles 1–2 cm. long, 2–5-flowered; fruit ovoid, obscurely angulate, 12–16 mm. long, short-spinulose.

MOMORDICA L. Balsam-apple

Slender, scandent herbs; tendrils simple or branched; flowers dioecious or monoecious, yellow, the staminate solitary or fasciculate, the pistillate solitary; calyx 5-lobate; corolla subrotate, 5-parted; stamens 3, with short, distinct filaments, the anther cells flexuous; fruit ovoid to cylindric, 3-valvate, fleshy.—No other species are known from Central America.

Momordica Charantia L. *Sorosí, Pepino, Pepinillo.* Common in thickets of the tierra caliente, often forming dense tangles over old stumps, especially along open river banks; Guanacaste. Widely distributed in the tropics of both hemispheres. Stems very slender, much branched, somewhat pubescent; leaves long-petiolate, thin, 4–12 cm. wide, deeply 5–7-lobate, pubescent or glabrate, the lobes narrow, dentate, acute or obtuse; staminate peduncle bearing a broad, cordate bract at or below the middle; corolla 1.5–2 cm. long; fruit orange-yellow, obtusely tuberculate, 2–12 cm. long, the pulp bright red. The ripe fruits are sometimes eaten by children, but the flavor is not agreeable.

PITTIERA Cogn.

Scandent herbs; tendrils 4–5-fid; leaves rather large, thin, long-petiolate, ovate-cordate; flowers large, pale yellow, monoecious, all axillary and solitary; calyx of the staminate flower oblong-subcylindric, the 5 lobes triangular-subulate; corolla campanulate, lobate to the middle or more deeply, the lobes ovate, acute; stamens 3, the elongate filaments free; anthers linear, connate to form a head, one 1-celled, the others 2-celled; fruit fleshy, indehiscent, many-seeded; seeds broadly obovate, complanate, smooth, narrowly marginate.—The genus consists of about four species, in Central America and Mexico. It was named for Henry Pittier, whose name will ever be associated with Costa Rica and its flora.

Pittiera longipedunculata Cogn. Bull. Soc. Bot. Belg. 30, pt. 1: 272. 1891. *Chiverrillo, Guillotilla, Sandillita.* Roadside hedge, San José, *Pittier 3200.* Frequent in thickets about San José, 1,000–1,200 meters. Probably endemic. A large vine, the stems pilose; leaves mostly 5–10 cm. long, not lobate, remotely and minutely dentate, densely and minutely rough-pubescent on both surfaces, usually rounded and apiculate at the apex, deeply cordate at the base; staminate peduncles as much as 20 cm. long, the calyx densely puberulent, 14–17 mm. long, the lobes 12–18 mm. long; corolla punctate-furfuraceous, 2.5 cm. long; pistillate peduncles 1 cm. long or less; fruit elliptic-ovoid, about 7 cm. long and 4 cm. broad, green with pale yellow stripes; seeds 1 cm. long, 6–7 mm. wide, rounded at the apex, attenuate at the base. The Bribrí name is recorded as Urmeme-uó.

POLAKOWSKIA Pittier

Plants herbaceous or suffrutescent, scandent, glabrous or nearly so, the roots fleshy; leaves large, membranaceous, more or less trilobate, cordate at the base; tendrils 5-fid; flowers small, white, monoecious; staminate inflorescence racemose; calyx broadly campanulate, the teeth small, subulate; corolla lobes 5, spreading, ovate-triangular; stamens 5, the filaments connate to form a slender, elongate column, the anthers free, 4 of them connate in 2 pairs, the cells forming a depressed head; pistillate flowers solitary in the same axils with the staminate racemes; ovary 1-celled, 1-ovulate; fruit rather fleshy, obovoid-ellipsoid, somewhat compressed, 5-sulcate, with few rather hard, short spines near the base; seeds elliptic, smooth.—The genus consists of a single species. It was named for H. Polakowsky, an early collector in the mountains of Costa Rica.

Polakowskia Tacaco Pittier, Contr. U. S. Nat. Herb. 13: 131. *pl. 20; f. 40, 41.* 1910. *Tacaco, Tlacaco.* San José, 1,200 meters, *Wercklé 16674.* Frequent in thickets and forest of the central region; region of San Ramón; Guanacaste; at 1,900 meters or less. Endemic. Leaves long-petiolate, 5–10 cm. long or even larger, shallowly or deeply lobate, the lobes acuminate, dentate, often angulate-lobate at the base, white-punctate above; staminate racemes 6–20 cm. long, the filiform pedicels 1–2.5 cm. long; calyx tube 1.5 mm. long, the subulate teeth 1 mm. long; corolla 4 mm. long; fruiting peduncles 3–4 cm. long; fruit green, 4–6 cm. long, 1.5–2.5 cm. broad, narrowed at each end; seed about 2.5 cm. long and 1.5 cm. broad. The fruits are one of the common vegetables of central Costa Rica. In flavor and appearance they are much like small chayotes, but they vary greatly in quality, according to the amount of fiber present. The vines are often planted, but little attention is given them, other than gathering the fruits.

SECHIUM P. Br.

A scandent, perennial vine with very large, tuberous roots; tendrils branched; leaves large, lobate or angulate; flowers small, white, monoecious, the staminate racemose, the pistillate solitary or geminate; calyx hemispheric, 5-lobate; corolla rotate, 5-parted, the lobes ovate-lanceolate; stamens 3, the short filaments connate, the anther cells flexuous; fruit large, obovoid, sulcate, echinate or smooth, indehiscent, containing a single large seed.—The genus consists of one species.

Sechium edule (Jacq.) Swartz. *Chayote.* Cultivated abundantly in the temperate regions; also at lower and higher elevations; sometimes found more or less naturalized. Probably native in Mexico and Central America, but perhaps no longer known in a truly wild state. Plants often 10 meters long or more, much branched; leaves long-petiolate, the blades broadly ovate to rounded, mostly 10–20 cm. long, angulate or shallowly lobate, deeply cordate at the base, scabrous or almost smooth; staminate racemes long-pedunculate, the flowers short-pedicellate; calyx lobes 5–7 mm. long; corolla 1.5 cm. broad; fruit green, usually 8–12 cm. long. In some regions of the uplands there are large plantations of this vine, the plants growing over trellises or poles. The fruits are one of the favorite vegetables of Costa Rica, as also of other parts of Central America. There are many varieties, differing in size, shape, and color of the fruit. In some forms the fruits are covered with long, flexible spines, while in others the spines are lacking. Practically every part of the plant is useful for food. The young shoots are one of the *quelites* cooked and eaten like spinach. The large roots, somewhat resembling sweet potatoes in gross appearance, may be taken from the plant without apparent injury to it. Known in Costa Rica simply as *raíz* ("root"), they are one of the usual ingredients of the *plato nacional,* the national dish that appears upon the table for dinner almost every evening, and consists of a great variety of vegetables, boiled in plain water. The sliced roots are employed also for making a common *dulce* or dessert, boiled in sirup. When eaten they are found to be very crisp, and crunch between the teeth like shavings, or some similar substance. The chayote has been grown in the southern United States, without finding much favor there, perhaps because the American housewife tends to avoid new fruits or vegetables. Indian names reported by Pittier are: Pís (Cabécara), Se-uák (Bribrí), Tsua-uá (Brunka), Surú (Térraba), Pok-pog í-ku (Guatuso).

SICYDIUM Schlecht.

Reference: Cogniaux, Pflanzenreich IV. 275, I: 256. 1916.

Climbing herbs, tomentose or glabrate; leaves ovate, entire, cordate at the base; tendrils bifid; flowers minute, green or whitish, racemose or fasciculate along the branches of a usually lax and large panicle, dioecious; staminate calyx tube rotate, the corolla rotate, deeply 5-parted; stamens 3, free, 2 of the anthers 2-celled, the other 1-celled; fruit very small, globose, indehiscent, 1-seeded.—One other species is found in northern Central America.

Sicydium coriaceum Cogn. La Hondura de San José and region of San Ramón; at 1,100–1,400 meters. Colombia. Plants glabrous throughout; leaves subcoriaceous, short-acuminate, 5-nerved, 8–15 cm. long; panicles usually much exceeding the leaves, many-flowered, the pedicels capillary; corolla lobes linear, 2.5 mm. long.

Sicydium tamnifolium (HBK.) Cogn. Thickets of the tierra caliente; Guanacaste; Zarcero, at 1,600 meters. Mexico to West Indies and Ecuador. Plants abundantly pubescent, the leaves, especially, usually densely velutinous-pilose, 5–7-nerved; corolla lobes 1.5 mm. long; fruit black at maturity, 5–6 mm. long.

SICYOS L.

Slender, climbing vines, usually pubescent; leaves petiolate or the upper sessile, thin, angulate or lobate; tendrils branched; flowers monoecious, the staminate racemose or subcorymbose, very small; calyx tube broadly campanulate or cupular, the 5 small teeth remote, subulate; corolla rotate or subcampanulate, 5-parted; stamens 3, the filaments connate into a column, the anthers connate or free, the cells flexuous; pistillate flowers capitate, the peduncle in the same axil with the staminate flowers; fruit small, compressed or angulate, hard, indehiscent, usually aculeate.—A few other species have been collected in Central America.

Sicyos sertuliferus Cogn. Bull. Soc. Bot. Belg. 30, pt. 1: 277. 1891. Climbing on trees, bridge over the Río Tilirí, near San José, *Pittier 3199*. Occasional about San José and elsewhere on the Pacific slope. Endemic. Branches densely villous at the nodes, elsewhere pilosulous or glabrate; leaves short-petiolate, cordate-orbicular, sublobate or 5-lobate almost to the middle, punctate-scabrous above, densely puberulent beneath, the lobes triangular, the terminal one narrowly long-acuminate, the lateral ones acute; tendrils 5-fid; umbels 20–30-flowered, the flowers minute; fruit ovoid, compressed, short-rostrate, sparsely furnished with very long and short intermixed setae, the margins angulate-dentate.

LOBELIACEAE. Lobelia Family

Herbs or shrubs, sometimes more or less scandent, often with milky sap; leaves alternate, entire or dentate, without stipules;

flowers small or large, solitary and axillary or in racemes or umbels; calyx tube united with the ovary, the limb 5-lobulate or of 5 sepals; corolla gamopetalous, irregular, generally bilabiate, the tube often cleft on one side to the base; stamens 5, inserted with the corolla, the filaments sometimes united to form a tube, the anthers united; ovary 2–5-celled; fruit capsular or baccate.—No other genera are known in Central America.

BURMEISTERA Karst. & Triana

Reference: Wimmer, Repert. Sp. Nov. 30: 1–52. *pl. 123–126.* 1932.

Terrestrial or sometimes epiphytic herbs; leaves mostly petiolate and denticulate; flowers large, axillary; corolla tube broad at the base, attenuate upward and narrow below the lobes; anthers glabrous, or the 2 inferior ones barbate at the apex; fruit baccate, sometimes greatly inflated or swollen and bladder-like.—A few other species are known from Central America.

Burmeistera aurobarbata Wimmer, Repert. Sp. Nov. 30: 35. 1932. *Centropogon aurobarbatus* Wimmer, op. cit. 19: 251. 1924. Volcán de Barba, *Brade 2315.* Common in forests of Barba and Irazú, 1200–2,400 meters, frequent in the region of San Ramón. Endemic. A terrestrial or epiphytic herb, 1 meter long or less, glabrous; leaves somewhat coriaceous when dry, ovate-lanceolate, usually 3–9 cm. long, pale beneath; sepals green or reddish, 4–5 mm. long; corolla reddish green, 2 cm. long; lower anthers barbate at the apex.

Burmeistera coleoides (Vatke) Wimmer, Repert. Sp. Nov. 30: 35. 1932. *Siphocampylus coleoides* Vatke, Linnaea 38: 732. 1874. *Centropogon coleoides* Zahlbr. Ann. Hofmus. Wien 6: 439. 1891. Type collected by Warscewicz, probably in Costa Rica or Panama. Similar to *B. aurobarbata,* but the leaves broader, with more conspicuous teeth, the corolla only 15 mm. long. I have seen no material referable to this species, but I suspect it is the same plant as *B. aurobarbata.*

Burmeistera cyclostigmata Donn. Smith, Bot. Gaz. 20: 291. 1895. Near La Estrella, Prov. Cartago, 2,200 meters, *J. D. Smith 5845.* Frequent in the region south of Cartago, 1,200–2,200 meters; La Carpintera and La Palma de San José; region of San Ramón. Endemic. An almost glabrous herb of 1–1.5 meters, usually somewhat scandent; leaves large, lance-elliptic, inconspicuously denticulate, membranaceous; calyx green or dark red, the sepals linear, 6 mm. long or sometimes as much as 15 mm., usually entire; corolla green and red or dark purple, 2.5 cm. long; anthers glabrous; berry not inflated, 1.5 cm. long, white and purple or pink.

Burmeistera estrellana Wimmer, Repert. Sp. Nov. 30: 24. *pl. 123, f. 8.* 1932. La Estrella, Prov. Cartago, 2,300 meters, *Stork 1537.* Frequent on the slopes of Barba, in moist forest, 2,000–2,400 meters. Plants a meter high, erect, somewhat pubescent or almost glabrous; leaves elliptic, rather large, narrow-acuminate, denticulate, membranaceous; sepals small, triangular, 3–4 mm. long; corolla purplish or yellow, 18 mm. long.

Burmeistera macrocalyx Wimmer, Repert. Sp. Nov. 30: 19. *pl. 124, f. 22.* 1932. Desengaño, *Wendland 839.* Common in forests of Barba and Irazú, 1,400–2,400 meters. Reported also from Ecuador. A glabrous herb, as much as 2 meters high, erect or supported by other plants; leaves oblong or ovate-oblong, rather large, sinuate-dentate, narrow-acuminate; calyx purplish, the sepals oblong or narrowly lanceolate, 18–25 mm. long, denticulate; corolla green and very dark purple, 2 cm. long or larger; anthers glabrous; berries green, conspicuously inflated, 3–6 cm. long. This species is little different from *B. Pittieri.*

Burmeistera marginata Karst. & Triana. One collection obtained between La Estrella and Copey is referred here doubtfully by Wimmer, and material from Poás and the region of San Ramón is perhaps conspecific; at 1,850–2,500 meters. Colombia. Plants glabrous, subscandent; leaves short-petiolate, elliptic, about 11 cm. long and 4 cm. wide, cuspidate-acuminate, densely obtuse-dentate, with a conspicuous, submarginal nerve; flowers solitary, long-pedicellate; sepals triangular-oblong, 2–4 mm. long, subobtuse, entire; corolla greenish or purple, 2 cm. long.

Burmeistera microphylla Donn. Smith, Bot. Gaz. 25: 146. 1898. La Palma, 1,520 meters, *Wercklé 11600.* Known only from the original collection. (?)*Centropogon scandens* Planch, & Oerst. Vid. Medd. Kjoebenhavn 157. 1857. A small plant, probably epiphytic, pubescent; leaves ovate-elliptic, small, only 18–20 mm. long; sepals linear, 2 mm. long; corolla green, 2 cm. long; anthers barbate.

Burmeistera obtusifolia Wimmer, Repert. Sp. Nov. 29: 58. 1931. Near El Copey, 2,400 meters, *Stork 1633.* Known only from moist forests of the type region, 2,000–2,400 meters. Plants terrestrial, conspicuously pubescent; leaves small, short-petiolate, oblong-ovate, obtuse; sepals reflexed, oblong, 6–7 mm. long; corolla very dark purple-red, as much as 3.5 cm. long. The leaves are distichous.

Burmeistera parviflora Wimmer in herb., sp. nov.—Suffrutex epiphyticus, ramulis gracilibus flexuosis sparse pilis laxis villosulis; folia inter minora membranacea graciliter petiolata, petiolo usque 1.5 cm. longo glabro; lamina ovato-oblonga vel elliptico-oblonga 7–12.5 cm. longa 2–4.5 cm. lata longe anguste acuminata, basi plus minusve obliqua acuta vel obtusa, supra viridis glabra, subtus pallidior tantum ad nervos venasque villosula, nervis lateralibus utroque latere ca. 8 prope marginem in nervum collectivum regularem conjunctis; flores ex axillis superioribus nascentes, pedicellis gracillimis usque 6 cm. longis glabris folia fere aequantibus; hypanthium glabrum late turbinatum 3.5 mm. longum; sepala ovato-triangularia obtusa erecta fere 3 mm. longa; corolla lutea extus glabra, tubo usque labium inferiorem 1 cm. longo basin versus sensim paullo dilatato, corolla tota 17 mm. longa, lobis anguste acuminatis; antherarum tubus intus apice sparse barbatus.—In forest, Cerros de San Antonio de San Ramón, 1,100 meters, July, 1926, *Brenes 5636* (type in Herb. Field Mus.). San Antonio, west of La Palma de San Ramón, 1,400 meters, *Brenes 3802.* Cerros de La Balsa de San Ramón, 1,200 meters, *Brenes 4968.*

Burmeistera Pittieri Wimmer, Repert. Sp. Nov. 30: 19. *pl. 124, f. 20a.* 1932. *B. Pittieri* var. *decorans* Wimmer, op. cit. 20 (La Palma, *Tonduz 12522*). Volcán de Turrialba, 2,200 meters, *Pittier 13073.* Frequent in forests of the central region, 2,000–2,400 meters; region of San Ramón, 1,200 meters. Panama. A glabrous herb, erect or somewhat scandent, 1–1.5 meters long; leaves oblong, acuminate, denticulate; calyx purplish green, the sepals linear, 14–20 mm. long; corolla green and dark red, 2–2.5 cm. long; anthers glabrous; berry little inflated.

Burmeistera suerrensis (Donn. Smith) Wimmer, Repert. Sp. Nov. 30: 14. 1932. *B. cyclostigmata* var. *suerrensis* Donn. Smith, Bot. Gaz. 24: 394. 1897. Suerre, Llanos de Santa Clara, 300 meters, *J. D. Smith 6623.* Frequent in forests of the central region, especially on the slopes of Barba; 300–2,400 meters; region of San Ramón. Panama. An erect or somewhat scandent herb, about 1 meter high, almost glabrous; leaves membranaceous, rather large, ovate-oblong or elliptic, narrow-acuminate, denticulate; sepals oval or triangular, only 2–3 mm. long; corolla purplish green, 2.5 cm. long; anthers glabrous; berry little inflated.

Burmeistera tenuiflora Donn. Smith, Bot. Gaz. 25: 147. 1898. Alto del Roble, Volcán de Barba, 2,000 meters, *Pittier 19*. Collected also at La Palma and Yerba Buena, 1,400–2,000 meters. Endemic. A pubescent herb; leaves oblong or elliptic, narrow-acuminate; sepals narrowly linear, 10 mm. long; corolla yellowish, 18 mm. long; anthers glabrous.

Burmeistera vulgaris Wimmer, Repert. Sp. Nov. 30: 27. *pl. 123, f. 14.* 1932. Finca La Cima, above Los Lotes, near El Copey, 2,100–2,400 meters, *Standley 42686*. Region of Dota and slopes of Barba, 2,000–2,500 meters. Panama. An herb 1.5 meters or less in height; leaves oblong, narrowly acuminate, denticulate, membranaceous; sepals 4–5 mm. long; corolla green, 2.5 cm. long; berries much inflated, purplish, 3 cm. long.

CENTROPOGON Presl

Plants herbaceous or suffrutescent, sometimes more or less scandent; leaves membranaceous, small or large, usually dentate; flowers pedicellate, axillary or grouped in terminal, usually umbelliform racemes, large and showy, red or purple; anthers not barbate; fruit baccate, not inflated.—A few other species are known from Central America. The genus contains some of the most showy and brilliantly flowered plants of Costa Rica, notable for their abundant flowers, which often are of an intense, bright red. The genus is closely related to *Burmeistera* but differs in the form of the corolla, its tube being narrow above the ovary and gradually dilated upward.

Centropogon augostanus Wimmer, Repert. Sp. Nov. 38: 9. 1935. Prov. Cartago, forests near "Augosta," *Polakowsky 431*. Plants scandent, glabrous or nearly so; leaves broadly ovate, acute, somewhat pubescent beneath; flowers forming a short raceme; sepals 8 mm. long; corolla 3.5 cm. long, papillose. It is unfortunate that the species should have received such a specific name, based upon a word that certainly is not a Costa Rican locality name. I am not certain, but it seems probable that the word interpreted by Wimmer as the place name is really "Agosto," i.e., the month August. In addition, he gave the country as Mexico.

Centropogon Austin-Smithii Standl., sp. nov.—Suffrutex metralis, caulibus crassiusculis brunnescentibus fere omnino glabris, internodiis brevibus; folia modica petiolata herbacea, petiolo gracili 1–2.5 cm. longo glabro; lamina lanceolata vel oblongo-lanceolata 11–16 cm. longa 3.5–5.5 cm. lata longe anguste attenuato-acuminata, basi acuta vel subobtusa, interdum abrupte breviter decurrens,

ubique obscure adpresse remote crenata, supra viridis glabra, subtus paullo pallidior ad nervos venasque minutissime dense puberula, nervis lateralibus utroque latere ca. 7 obliquis arcuatis marginem fere attingentibus; flores ex axillis superioribus nascentes solitarii, pedicellis gracilibus ca. 3.5 cm. longis puberulis; hypanthium semiglobosum usque 5 mm. longum atque paullo latius; sepala viridia anguste triangularia 6 mm. longa acuminata integra; corolla intense coccinea 5 cm. longa extus glabra, tubo supra hypanthium paullo contracto, deinde faucem versus sensim contracto, fauce fere 1 cm. lato, lobis suberectis ovato-triangularibus caudato-acuminatis; antherae longiexsertae 7 mm. longae apice sparse breviter hispidulae.—Palmira, 1,800 meters, on open, recently cleared land, September, 1937, *Austin Smith A327* (type in Herb. Field Mus.). The branches are hard and ligneous.

Centropogon brumalis Standl., sp. nov.—Herba elongata debilis subscandens omnino glabra, ramis gracilibus, internodiis brevibus; folia inter minora oblongo-ovata 5–8.5 cm. longa 2–4 cm. lata longe sensim anguste acuminata, basi breviter cordata, in toto margine arcte pectinato-laciniatula, dentibus angustis patentibus fere glanduliformibus, subtus paullo pallidiora, venis fuscis valde conspicuis; flores axillares, pedicellis gracillimis 3–6 cm. longis; hypanthium oblongo-campanulatum 6 mm. longum 3.5 mm. latum basi rotundatum glabrum; sepala anguste lineari-attenuata 5–6 mm. longa erecta; corolla purpurea extus glabra 3.5 cm. longa, tubo supra basin angustato, dein versus faucem paullo ampliato, ad faucem 5 mm. lato.—Wet forest, Cerro de Las Vueltas, Prov. San José, 2,700–3,000 meters, *Standley & Valerio 43984* (type in U. S. Nat. Herb.). A species well marked by its complete lack of pubescence. In general appearance it is similar to *C. palmanus*.

Centropogon coccineus (Hook.) Regel. Forests of the Atlantic tierra caliente. Panama. Plants herbaceous, ascending or subscandent, the branches minutely puberulent; leaves slender-petiolate, ovate, 5–8 cm. long, acute or acuminate, obtuse or rounded at the base, densely, acutely, and unequally serrate, glabrous above, pilosulous beneath on the veins; flowers axillary, the pedicels 2.5–6.5 cm. long; sepals linear, 8–10 mm. long, attenuate, remotely serrate; corolla purple-red, 4.5 cm. long, sparsely and minutely villosulous.

Centropogon cordifolius Benth. var. **dentatus** Wimmer in herb., var. nov.—Herba debilis subscandens, caulibus gracilibus glabris; folia graciliter petiolata herbacea, petiolo ca. 2 cm. longo;

lamina ovata 3.5–10 cm. longa 3–6 cm. lata acuminata, basi truncata vel breviter cordata, ubique grosse inaequaliter salienter serrata, supra viridis glabra, subtus pallida praesertim ad venas villosula; flores ex axillis superioribus nascentes solitarii longipedicellati; hypanthium glabrum, sepalis lanceolato-oblongis 5–6 mm. longis subrecurvis glabris; corolla rubra extus glabra fere 2.5 cm. longa.—Socorro de San Ramón, 1,300–1,400 meters, September, 1926, *Brenes 4991* (type in Herb. Field Mus.). Cerros de San Antonio de San Ramón, 1,100 meters, *Brenes 5635*. Piedades de San Ramón, 1,400 meters, *Brenes 3716*. The typical form of the species occurs in Guatemala and southern Mexico.

Centropogon costaricanus Planch. & Oerst. Vid. Medd. Kjoebenhavn 156. 1857. *Siphocampylus Regelii* Vatke, Linnaea 38: 732. 1874 (Irazú, *Wendland 679*). *C. affinis* var. *costaricanus* Zahlbr. Ann. Hofmus. Wien 6: 437. 1891. *C. costaricanus* var. *Cufodontidis* and var. *tomentellus* Wimmer, Ann. Naturhist. Mus. Wien 46: 240. 1933. Type collected in Costa Rica by Oersted (photo. of type, *Oersted 9240*, collected near Cartago, in Herb. Field Mus.). Frequent in forests of the slopes of the central mountains, 2,100–2,800 meters. Endemic. An erect herb of 1–1.5 meters, with abundant pubescence of branched hairs; leaves oval or elliptic, sometimes oblong, obtuse to short-acuminate, with minute teeth, more or less tomentose beneath, the tomentum usually grayish; sepals very short; corolla red, somewhat tomentose, the lobes yellow.

Centropogon erastus Wimmer, Repert. Sp. Nov. 38: 8. 1935. La Palma, *A. C. Brade 2395* (photo. of type in Herb. Field Mus.). Plants scandent, the stems glabrous; leaves broadly ovate, 10–15 cm. long, short-acuminate, obtuse to cordate at the base, somewhat pubescent beneath; flowers arranged in a short raceme; sepals narrow-triangular, 1.5 cm. long; corolla red or purple, puberulent, 3.5 cm. long.

Centropogon Gutierrezii (Planch. & Oerst.) Wimmer, Repert. Sp. Nov. 22: 202. 1926. *Siphocampylus Gutierrezii* Planch. & Oerst. Vid. Medd. Kjoebenhavn 155. 1875. *S. thysanopetalus* Vatke, Linnaea 38: 731. 1874 (type collected in Costa Rica or Veraguas by Warscewicz). Volcán de Irazú, 2,700 meters, *Oersted* (photo. of type, *Oersted 9239*, in Herb. Field Mus.). Forests of Poás, Barba, and Irazú, 2,500–3,150 meters. Endemic. An herb about a meter high, somewhat pubescent; leaves short-petiolate, oblong, acute or acuminate, conspicuously serrulate, the veins very prominent beneath; flowers axillary, long-pedicellate; sepals linear, as much as 1.5 cm. long; corolla pale red or purple, 5 cm. long, somewhat tomentose.

Centropogon nutans Planch. & Oerst. Vid. Medd. Kjoebenhavn 156. 1875. Type collected by Oersted. Very common in mountain forests of the central region, 1,200–2,000 meters; region of San Ramón; Guanacaste, 500–700 meters. Panama. An herb of 1–2 meters, almost glabrous, erect or subscandent, somewhat succulent; leaves large, oval or broadly ovate, acute, rounded or obtuse at the base, almost entire; flowers arranged in a short, umbelliform raceme which is usually pendent; sepals linear, 1 cm. long or larger; corolla bright red, 5 cm. long, papillose. A characteristic and very handsome plant of the central mountains, often growing in great abundance.

Centropogon palmanus (Donn. Smith) Wimmer, Repert. Sp. Nov. 38: 7. 1935. *C. nematosepalus* var. *palmanus* Donn. Smith, Bot. Gaz. 44: 115. 1907. La Palma, 1,500 meters, *Pittier 271*. Forests of Barba and Irazú, 1,500–2,400 meters. Endemic. A rather slender, procumbent herb; leaves small, ovate, acuminate, somewhat cordate at the base, finely serrate; flowers axillary, the pedicels elongate; sepals about 4 mm. long; corolla bright red, 3.5 cm. long, sparsely pubescent.

Centropogon poasensis Gleason, Torreya 25: 92. 1925. Volcán de Poás, Prov. Alajuela, 2,500 meters, *J. D. Smith 6626*. Known only from the upper slopes of Poás, at 2,100–2,600 meters. An herb a meter high, the leaves almost coriaceous, ovate-oblong, narrow-acuminate, rounded or obtuse at the base, 4–11 cm. long, glabrous above, densely tomentose beneath, the tomentum composed of branched, brownish hairs; flowers axillary or forming a short raceme; ovary densely tomentose, the sepals 3 mm. long; corolla red, 3–4 cm. long, tomentose.

Centropogon porphyrodontus Donn. Smith, Bot. Gaz. 44: 114. 1907. Valle de Los Arcángeles, Prov. San José, 1,900 meters, *Pittier 12307*. Region of Copey and Cerro de Las Vueltas, at 3,000 meters or less. Endemic. Leaves somewhat coriaceous, lance-ovate, 7–13 cm. long, narrow-acuminate, rounded or subcordate at the base, somewhat puberulent beneath; flowers axillary; sepals linear; corolla pink, glabrous, 4.5 cm. long.

Centropogon Smithii Wimmer, Ann. Naturhist. Mus. Wien 46: 240. 1933. *Siphocampylus discolor* Donn. Smith, Bot. Gaz. 23: 248. 1897, non Kunth & Bouché. Forests of Rancho Flores, Volcán

Barba, 2,000 meters, *Tonduz 2149.* Forests of Barba and Irazú, 1,800–2,500 meters; region of Zarcero. Endemic. A usually simple herb of 1–3 meters, sometimes more or less suffrutescent; leaves large, short-petiolate, obovate-oblong, acuminate, narrowed toward the base, finely dentate, somewhat furfuraceous-pubescent; stems narrowly winged; flowers axillary, the pedicels greatly elongate; sepals linear, 1.5–2 cm. long; corolla pale green, at times somewhat yellowish, about 5 cm. long, more or less furfuraceous. The species of this genus are sometimes described by writers as shrubs, but they are really herbs, at most merely somewhat suffrutescent near the base.

Centropogon solanifolius Benth. *Pavoncillo. C. solanifolius* var. *hirtellus* Wimmer, Ann. Naturhist. Mus. Wien 46: 241. 1933 (Volcán de Irazú, 2,400 meters, *Cufodontis 285*). Frequent in mountain forests of the whole central region, 1,500–2,800 meters; region of San Ramón. Extending to Ecuador. An herb of 1–1.5 meters, erect or somewhat scandent, glabrous or nearly so; leaves oblong-elliptic, narrow-acuminate, crenate, acute at the base; flowers in terminal racemes, these elongate or umbelliform; sepals linear, short; corolla orange-red, 4.5–5 cm. long, somewhat pubescent. A highly ornamental plant, abundant in many regions. It has been reported from Costa Rica as *C. grandis* (L.) Presl.

Centropogon tortilis Wimmer, Repert. Sp. Nov. 22: 217. 1926. Río Chirripó, *Pittier 16033.* A scandent herb of 2.5 meters, the stems glabrous; leaves very large, obovate-elliptic, rounded and short-acuminate at the apex, narrowed toward the base, glabrous; flowers forming a short, terminal raceme; sepals 5 mm. long; corolla red, 3 cm. long, pilose.

Centropogon Valerii Standl., sp. nov.—Herba erecta metralis, caule tenuiter villosulo vel puberulo glabrato, internodiis brevibus; folia membranacea, petiolo 3–8 mm. longo; lamina lanceolato-linearis vel lineari-oblonga 5.5–13 cm. longa 1–2.5 cm. lata anguste acuminata, basi acuta, in toto margine arcte minute dentata, supra glabra, subtus pallidior minutissime puberula vel fere glabra; flores axillares, pedicellis gracilibus 3–3.5 cm. longis; hypanthium obovoideo-globosum 5 mm. altum, fere glabrum; sepala linearia 2 mm. longa serrata; corolla ca. 3 cm. longa, extus minutissime puberula, tubo supra calycem angustato, deinde sensim dilatato, ad faucem 6 mm. lato, lobis lineari-lanceolatis attenuatis valde decurvis, superioribus ad 12 mm. longis; tubus staminalis longe exsertus villosus, antheris glabris, inferioribus apice dense albo-setosis.—Ojo de Agua, 2,850 meters, *H. E. Stork 3022* (type in Herb. Field Mus.). Cerro de Las Vueltas, Prov. San José, 2,700–3,000 meters, *Standley & Valerio 43751, 43951*. The leaves are the narrowest that I have noted among all the North American species.

Centropogon Warscewiczii Vatke, Linnaea 38: 716. 1874. Type collected in Costa Rica or Panama by Warscewicz. Glabrous, the leaves oblong, rather acute, narrowed toward the base, the upper ones sessile; flowers arranged in short, umbelliform racemes; sepals linear-lanceolate, 2–3 times as long as the ovary; corolla pilose.

Centropogon Wimmerii Standl., sp. nov.—Herba metralis, caule pilis longis multilocularibus laxis sparse villoso; folia mediocria longipetiolata membranacea, petiolo gracili 1.5–3 cm. longo; lamina ovato-ovalis vel elliptico-ovata 8–9 cm. longa 4.5–5 cm. lata abrupte breviter acuminata, acumine anguste acute attenuato, basi late rotundata, supra in sicco fusca ad costam sparse villosa, subtus fere concolor praesertim ad venas pilis longis simplicibus patentibus villosa, margine irregulariter adpresso-crenato; flores axillares, ut videtur nutantes, pedicellis ad 9 cm. longis sparse villosis; hypanthium hemisphaericum 5 mm. longum basi late rotundatum sparsissime villosum; sepala lineari-attenuata viridia 4 mm. longa ciliata erecta; corolla coccinea 3 cm. longa laxe villosa, tubo supra hypanthium paullo constricto deinde sensim dilatato, ad faucem 6 mm. lato, lobis lineari-oblongis attenuatis, superioribus solemniter deflexis; antherae glabrae, superiores apice dense albo-setosae.—Las Nubes, Prov. San José, moist forest, 1,500–1,900 meters, *Standley 38739* (U. S. Nat. Herb., type). Probably related to *C. costaricanus*, but separated by its pubescence of simple, not branched hairs.

HETEROTOMA Zucc.

Annual or perennial herbs, the leaves membranaceous, alternate, dentate; flowers small or large, racemose; corolla prolonged at the base as a small or large spur.—No other species are known from Central America.

Heterotoma lobelioides Zucc. Forests of the central region, 1,500–2,500 meters. Extending to Mexico. An herb 60 cm. or more in height, almost glabrous or pubescent; leaves ovate or lanceolate, acuminate, rounded at the base; flowers large, almost 4 cm. long, red and yellow. A very showy plant because of its large, vividly colored flowers.

Heterotoma tenella Turcz. Reported from Costa Rica by Hemsley, collected by Endres, at 1,050 meters. Extending to Mexico. A small, annual herb, simple or branched, pubescent; leaves small, reniform or cordate; flowers very small, blue.

ISOTOMA Lindl.

A single species is found in Central America.

Isotoma longiflora (L.) Presl. *Jazmín de estrella, Jazmincillo.* Occasional in the tierra caliente. A species of wide distribution. A somewhat pubescent herb with thick stems; leaves almost sessile, oblanceolate, coarsely dentate; flowers axillary, short-pedicellate, white, 10 cm. long; fruit capsular. Easy to recognize because of the large, white flowers, with a very long and slender tube.

LAURENTIA Neck.

Slender, small, annual herbs, the small, narrow leaves alternate, the peduncles axillary, 1-flowered; calyx 5-parted or 5-dentate; corolla straight or oblique, very small, the tube entire or shortly cleft; anthers 2, short-setose at the apex; fruit a small capsule, loculicidally bivalvate.—Probably no other species are found in Central America. These small plants look much like some of the smaller species of *Lobelia*, such as *L. xalapensis*, but in the latter genus the corolla tube is cleft almost or quite to the base.

Laurentia irazuensis (Planch. & Oerst.) Wimmer, comb. nov. *Lobelia irazuensis* Planch. & Oerst. Vid. Medd. Kjoebenhavn 153. 1857. Irazú, *Oersted.* Frequent in meadows and pastures of the central region; regions of Dota and San Ramón; at 1,000–1,800 meters. Endemic. Plants simple or somewhat fastigiately branched, usually 30 cm. high or less, the stems hispidulous or hirtellous, sometimes glabrate; leaves lance-oblong to almost linear, mostly less than 2 cm. long, acute to attenuate, dentate, sessile, glabrous or nearly so; pedicels filiform, mostly shorter than the subtending leaves, the flowers abruptly upcurved; sepals linear-attenuate, becoming 5–6 mm. long, ciliate, equaling the capsule; corolla blue-purple, scarcely 5 mm. long.

Laurentia micrantha (HBK.) Zahlbr. El Tablazo, region of San Ramón, and doubtless elsewhere, growing in pastures. Ranging to Mexico. Similar to the preceding species but often more slender, the stems glabrous or hirtellous; pedicels often much longer than the subtending leaves; sepals scarcely more than 3 mm. long; corolla violaceous.

LOBELIA L.

Plants herbaceous or suffrutescent, annual or perennial; flowers small or large, axillary or in terminal racemes, pedicellate; corolla not spurred, cleft nearly to the base on one side; anthers glabrous, sometimes barbate at the apex.—Other species are known from Central America.

Lobelia irasuensis Planch. & Oerst. Vid. Medd. Kjoebenhavn 153. 1857. *L. Warscewiczii* Vatke, Linnaea 38: 718. 1874 (Costa Rica or Veraguas, *Warscewicz*). Volcán de Irazú, *Oersted.* Meadows on the upper slopes of Irazú. Chiriquí region, Panama, at about 3,000 meters. Plants perennial, almost glabrous, simple, mostly 30 cm. high or less; leaves lance-linear, sessile, denticulate; racemes elongate, slender, few-flowered; corolla blue, about 8 mm. long.

Lobelia laxiflora HBK. *Yuquilla, Ceragallo.* (?)*Tupa costaricana* Planch. & Oerst. Vid. Medd. Kjoebenhavn 154. 1857. *L. costaricana* Wimmer, Ann. Naturhist. Mus. Wien 46: 239. 1933. Frequent in thickets of the central region, 1,000–1,600 meters. Panama to Mexico. A branched herb about a meter high, more or less pubescent; leaves lanceolate, sessile or short-petiolate, denticulate; flowers axillary, red, about 3 cm. long. A conspicuous plant because of its large, bright red flowers, common in many regions of Central America. Wimmer considers (according to determinations in the herbarium) that the Costa Rican material of this relationship represents two or more species, but the characters by which they are to be separated are not apparent to the writer. It is probably more satisfactory to give the several forms varietal status, unless really good characters can be suggested for separating them as species.

Lobelia poasensis Wimmer, Ann. Naturhist. Mus. Wien 46: 239. 1933. Meadows of Volcán de Poás, 2,500 meters, *Cufodontis 605.* Known, apparently, only from the type. Plants perennial(?), the stems erect or ascending, 15–25 cm. long, glabrous; leaves on very short petioles or the uppermost sessile, rhombic or rhombic-elliptic to lanceolate, acute, cuneate at the base, dentate, glabrous or nearly so; racemes 10–20 cm. long, the pedicels 7–10 mm. long; calyx tube 1 mm. long, the lobes subulate, entire, 1–2 mm. long, spreading; corolla lilac, glabrous, 6 mm. long, the tube 3 mm. long.

Lobelia splendens Willd. Buenos Aires, 480 meters, and probably in other regions of the tierra caliente; region of San Ramón, 800 meters. Widely distributed in tropical America. Plants stout and erect, growing usually on the banks of small streams, almost glabrous; leaves nearly linear, sessile, attenuate, entire; flowers red, 3 cm. long, in short or elongate racemes. The plant is known in Panama by the name Flor de garza.

Lobelia urticifolia Wimmer. *L. neglecta* Vatke. Frequent in thickets and other shady places of the central region, 1,000–2,300 meters; El General. A species of wide distribution. A branched herb, erect or procumbent, pubescent or almost glabrous; leaves petiolate, ovate or broadly lanceolate, acuminate, dentate; flowers purplish white, axillary, 8 mm. long, the pedicels very long and slender.

Lobelia xalapensis HBK. Pastures of the Meseta Central, descending to the Atlantic tierra caliente; region of San Ramón; at 1,600 meters or less. Widely distributed in tropical America. Plants annual, mostly less than 50 cm. high, usually branched, somewhat pubescent with fine, short hairs; leaves petiolate, mostly deltoid-ovate, obtuse or acute, dentate; flowers blue or purplish, 4–5 mm. long, on very long, slender pedicels. The Costa Rican plant often has been referred to *L. Cliffortiana* L.

SIPHOCAMPYLUS Pohl

Erect or somewhat scandent herbs, in most characters similar to *Burmeistera* and *Centropogon*, but differing from those genera by the capsular fruit. With flowering specimens it is difficult to distinguish the two groups.

Siphocampylus costaricae Vatke, Linnaea 38: 730. 1874. Volcán de Barba, *Hoffmann 60* (photo. of type, *Hoffmann 60*, in Herb. Field Mus.). Known only from the original collection. Leaves petiolate, ovate, acuminate, cordate at the base, dentate, glabrous above, pubescent beneath; sepals linear, 4–5 mm. long; corolla red, 5 cm. long. I have seen no specimens of this plant, which probably belongs to the genus *Centropogon*. The description is suggestive of *C. palmanus*.

Siphocampylus nematosepalus (Donn. Smith) Wimmer, Repert. Sp. Nov. 38: 22. 1935. *Centropogon nematosepalus* Donn. Smith, Bot. Gaz. 44: 114. 1907. Cuesta de Los Borucas, Puntarenas, 2,300 meters, *Pittier 10533*. Plants paleaceous-pubescent, the leaves membranaceous, lance-ovate, 7.5–10 cm. long, cordate at the base, denticulate; flowers axillary; sepals filiform, 9 mm. long; corolla purple-red, 4.5 cm. long, pubescent.

Siphocampylus roseus Donn. Smith, Bot. Gaz. 23: 249. 1897. Along the railroad line, Siquirres, *Pittier 3165.* Also at Puerto Viejo. Endemic. An almost glabrous herb; leaves ovate, acuminate, 8–13 cm. long, dentate, puberulent on the nerves beneath; flowers axillary; sepals oblong, 7–8 mm. long; corolla puberulent, 4.5–5 cm. long; capsule globose, 2 cm. long.

SPHENOCLEA Gaertn.

A single species is found in America.

Sphenoclea zeylanica Gaertn. Marshy places of the Atlantic coast. A species of wide distribution. A glabrous herb a meter high or less, branched; leaves petiolate, entire, elliptic to lanceolate, acute or obtuse, pale; flowers small, white, in very dense, short or elongate, pedunculate spikes. In appearance the plant is altogether unlike other representatives of the family.

COMPOSITAE. Composite Family

Herbs, shrubs, or trees, sometimes scandent or epiphytic; leaves opposite or alternate, entire to dissected, never truly compound although sometimes apparently so; flowers collected in a head (rarely 1-flowered) on a receptacle, surrounded by an involucre of phyllaries (often called bracts); corolla gamopetalous, regular, tubular, and 5-dentate (rarely 2–4-dentate), bilabiate, or ligulate (i.e., flattened, liguliform, and usually 2–5-dentate), rarely wanting in the pistillate flowers; stamens (in the perfect or staminate flowers) almost always 5, united by the anthers or rarely free, inserted on the corolla; ovary inferior, 1-celled; style usually 2-branched, the branches stigmatiferous inside, often with sterile appendages at the apex; fruit an achene, with a single seed, often bearing at the apex a pappus of setae, awns, or scales.—The corollas are of four chief kinds: ligulate or strap-shaped, bilabiate, tubular, and filiform. Heads composed of one kind of flowers only are called *homogamous;* those of two or more kinds *heterogamous;* when heterogamous, the central flowers (disk) are always perfect, the peripheral pistillate or neutral (lacking the style). Homogamous heads in which all the flowers are perfect and have ligulate (in this case always 5-dentate) corollas are called *ligulate;* homogamous heads in which all the corollas are tubular and perfect or staminate, or filiform and pistillate, are called *discoid.* Heterogamous heads in which the peripheral corollas are ligulate are called *radiate;* those in which the peripheral flowers are pistillate, with tubular, filiform, or abortive corollas are called *disciform.* The receptacle may be naked, bristly, or paleaceous (bearing pales or chaff). The generic characters are drawn to a considerable extent from the character of the pappus, which may be of bristles, awns, scales, or teeth, reduced to a crown or cup, or entirely wanting. (From S. F. Blake, Contr. U. S. Nat. Herb. 23: 1401–1402. 1926.)

The Compositae constitute the largest family of plants. Although well represented in Costa Rica, they are far less abundant, in general, in the tropics than in temperate areas. In preparation of the account of the Costa Rican species the writer is deeply indebted to Dr. S. F. Blake, who read most of the manuscript, and suggested changes and additions. He is, however, in no way responsible for any errors that may occur on the following pages. The account of the genus *Senecio* has been read by Dr. J. M. Greenman, who has suggested corrections, and supplied descriptions of several new species.

Key to the tribes and genera

Corollas all bilabiate or ligulate.
  Sap milky; corollas all ligulate; herbs...........XII. *Cichorieae.*
  Sap not milky; central corollas bilabiate, not ligulate; chiefly shrubs, sometimes herbs....................XI. *Mutisieae.*
Corollas not bilabiate, the central ones, at least, not ligulate but with regular, 4–5-fid corollas, the outer flowers often ligulate.
  Anthers caudate at the base.
    Anthers long-appendaged at the apex; plants prickly. X. *Cynareae.*
    Anthers not appendaged at the apex; plants never prickly.
      Pappus none or wool-like.................IX. *Calenduleae.*
      Pappus present, not wool-like.................IV. *Inuleae.*
  Anthers not caudate at the base.
    Style branches elongate, acute, hispidulous outside throughout their length.
      Heads yellow...........................VIII. *Senecioneae.*
      Heads white or purplish, never yellow.
        Achenes 4-angulate, clavate; pappus consisting of paleae with a strong costa...................VI. *Helenieae.*
        Achenes not 4-angulate and clavate; pappus not consisting of paleae with a strong costa..........I. *Vernonieae.*
    Style branches not as above.

Style branches usually elongate, linear or clavate, obtuse, not hispidulous outside at the apex, the stigmatic lines only below the middle and inconspicuous; heads never yellow. II. *Eupatorieae*.

Style branches, when elongate, hispidulous outside or at the apex, the stigmatic lines reaching nearly to the apex; heads often yellow.

Phyllaries scarious-marginate; heads often nodding; style tips truncate, hispidulous..........VII. *Anthemideae*.

Phyllaries not scarious-marginate, or else the heads not nodding or the style tips acute.

Receptacle paleaceous, at least in the staminate heads, or else the leaves all or mostly opposite; pappus never of bristles........................V. *Heliantheae*.

Receptacle not paleaceous, rarely setose, or else the leaves alternate.

Pappus present, chiefly or entirely of soft, capillary bristles; involucre not glandular-punctate.

Style tips acute....................III. *Astereae*.

Style tips truncate or subtruncate. VIII. *Senecioneae*.

Pappus none, or of squamellae, awns, or stiff bristles, or else the involucre glandular-punctate.

Leaves alternate....................III. *Astereae*.

Leaves opposite, at least below, or else the involucre glandular-punctate.............VI. *Helenieae*.

I. VERNONIEAE

Heads distinct, not aggregated into secondary heads or glomerules.

Pappus an entire, cartilaginous crown................*Struchium*.

Pappus of scales, bristles, or scales and bristles.

Leaves lepidote...................................*Piptocarpha*.

Leaves not lepidote.

Inner pappus of a few linear scales; heads 2-flowered. *Oliganthes*.

Inner pappus of terete or slightly flattened bristles; heads with 3 to many flowers........................*Vernonia*.

Heads aggregated into secondary heads or glomerules.

Corolla 3–5-dentate; style branches short; phyllaries 2–5. *Rolandra*.

Corolla 5-cleft; style deeply bilobate; phyllaries 8 or more.

Pappus bristles dissimilar, 2 of them longer and conduplicate near the apex .... *Pseudelephantopus.*

Pappus bristles all alike, straight.

Pappus bristles numerous, not broadened at the base. *Orthopappus.*

Pappus bristles about 5, dilated and flattened at the base. *Elephantopus.*

II. EUPATORIEAE

Pappus none or a very short crown.

Heads 3-flowered; anthers not appendaged at the apex . . *Piqueria.*

Heads several–many-flowered; anthers appendaged at the apex.

Pappus none .... *Alomia.*

Pappus a low, paleaceous crown .... *Ageratum.*

Pappus present, well developed.

Achenes prismatic and 8–10-costate .... *Brickellia.*

Achenes 4–5-costate.

Pappus of bristles only.

Phyllaries 4; heads 4-flowered; plants scandent ..... *Mikania.*

Phyllaries and flowers more numerous; plants not scandent.

Pappus bristles 5–8 .... *Fleischmannia.*

Pappus bristles numerous .... *Eupatorium.*

Pappus at least in part of squamellae or awns.

Phyllaries 5–8, uniseriate, subequal .... *Stevia.*

Phyllaries more numerous.

Pappus of bristles and squamellae .... *Fleischmannia.*

Pappus of squamellae only .... *Ageratum.*

III. ASTEREAE

Plants shrubs or at least conspicuously frutescent.

Heads radiate .... *Diplostephium.*

Heads discoid.

Plants dioecious, the heads strictly staminate or pistillate. *Baccharis.*

Plants polygamo-dioecious, the staminate heads as in *Baccharis,* the pistillate with 1–15 central perfect flowers. *Archibaccharis.*

Plants herbaceous, low.

Pappus none or reduced to a ring or collar.

Heads discoid . . . . *Laestadia.*
Heads radiate.
  Plants with branched, leafy stems . . . . *Egletes.*
  Plants with naked, scapiform stems . . . . *Bellis.*
Pappus of numerous bristles.
  Phyllaries conspicuously unequal in length; style tips acute or acuminate . . . . *Aster.*
  Phyllaries all equal in length or nearly so; style tips short, obtuse . . . . *Erigeron.*

IV. INULEAE

Phyllaries dry but not scarious.
  Leaves dentate . . . . *Pluchea.*
  Leaves entire . . . . *Tessaria.*
Phyllaries scarious, usually white or colored.
  Phyllaries in part raylike; heads large; cultivated plants. *Helichrysum.*
  Phyllaries not raylike; heads small; native plants . . . . *Gnaphalium.*

V. HELIANTHEAE

Heads with usually only 1 fertile flower.
  Involucre strongly compressed, the outermost phyllary cordate and bractlike . . . . *Delilia.*
  Involucre not compressed, the phyllaries not cordate . . . . *Milleria.*
Heads with few to many fertile flowers.
  Ray flowers pistillate, fertile; disk flowers perfect, sterile.
    Leaves compound; plants scandent . . . . *Hidalgoa.*
    Leaves simple; plants not scandent.
      Pistillate corollas tubular.
        Pales of the disk enclosing the achenes; heads in small cymes . . . . *Ichthyothere.*
        Pales of the disk not enclosing the achenes; heads densely cymose-paniculate . . . . *Clibadium.*
      Pistillate corollas liguliform.
        Phyllaries subtending the ray achenes indurate and completely enveloping the achenes . . . . *Melampodium.*
        Phyllaries not indurate and completely enveloping the achenes.

Petioles dilated and clasping at the base; achenes not triquetrous. . . . . *Polymnia.*

Petioles not dilated at the base; achenes triquetrous.

Plants shrubs. . . . . *Rensonia.*

Plants herbaceous. . . . . *Baltimora.*

Ray flowers, when present, pistillate or neutral; disk flowers perfect, fertile.

Ray corollas sessile, persistent.

Disk achenes strongly compressed. . . . . *Zinnia.*

Disk achenes quadrangular. . . . . *Heliopsis.*

Ray corollas with a distinct tube and deciduous, or wanting.

Pappus of plumose squamellae. . . . . *Tridax.*

Pappus not of plumose squamellae, sometimes none.

Achenes contracted into a conspicuous, stipitiform base. *Podachaenium.*

Achenes not contracted into a stipitiform base.

Involucre distinctly double, the outer phyllaries few, herbaceous, the inner submembranous.

Trees or shrubs, the pubescence usually tomentose; rays white. . . . . *Montanoa.*

Herbs or, if shrublike, without tomentum; rays variously colored.

Achenes rostrate. . . . . *Cosmos.*

Achenes not rostrate.

Pappus none.

Plants without viscid pubescence. . . . . . . *Dahlia.*

Plants with abundant, viscid pubescence. *Sigesbeckia.*

Pappus of awns.

Pappus awns antrorse-ciliate or smooth; achenes marginate or winged; cultivated plants. *Coreopsis.*

Pappus awns retrorse-hispid or rarely smooth; achenes not marginate or winged; native plants. . . . . *Bidens.*

Involucre not distinctly double.

Pappus of the disk achenes consisting of 4–many free, usually equal or subequal awns or squamellae.

Heads white; plants herbaceous or chiefly so. *Melanthera.*

Heads usually yellow; usually shrubs, rarely herbs.

Achenes obovoid, somewhat compressed; phyllaries not indurate.......... *Hymenostephium.*

Achenes subterete or 4–5-angulate; phyllaries indurate, or the outer ones sometimes herbaceous.............................. *Calea.*

Pappus of the disk achenes of 2–3 awns, with or without squamellae, or a crown of united squamellae, or wanting, or at least not as described above.

Achenes strongly compressed, flat or flattish.

Pappus of awns and squamellae.

Rays neutral........................ *Oyedaea.*

Rays pistillate or none.

Achenes marginate or winged, the wings not decurrent on the awns........ *Zexmenia.*

Achenes winged, the wings decurrent on the awns...................... *Otopappus.*

Pappus various, but not of both awns and squamellae.

Achenes, at least some of them, winged.

Heads discoid; pappus annular; leaves alternate....................... *Garcilassa.*

Heads radiate.

Outer achenes not winged...... *Synedrella.*

Outer achenes winged.

Pappus of 2–5 stout aristae united at the base; low herbs...... *Calyptocarpus.*

Pappus of usually 2 slender, free aristae; shrubs or large, coarse herbs. *Verbesina.*

Achenes not winged.

Plants woody shrubs or vines........ *Salmea.*

Plants herbaceous.

Cauline leaves laciniate or lobate. *Chrysanthellum.*

Cauline leaves merely dentate.

Disk of the head strongly convex; flowers yellow or white; low herbs. *Spilanthes.*

Disk not very convex; flowers yellow; tall, coarse herbs........... *Simsia.*

Achenes thickened, not thin and compressed.

Heads white, or the disk yellow and the rays white, pink, or red.

Receptacle elongate, the disk very convex or elongate...................... *Isocarpha.*

Receptacle plane or merely convex.

Disk yellow, the rays white, pink, or red. *Galinsoga.*

Disk and rays white................ *Eclipta.*

Heads yellow.

Rays pistillate.

Pappus of the disk achenes none.. *Rumfordia.*

Pappus of the disk achenes present.

Achenes acutely marginate or winged. *Zexmenia.*

Achenes not marginate or winged.

Achenes angulate; pappus none or of minute scales............. *Jaegeria.*

Achenes not angulate; pappus annular or of more or less connate scales. *Wedelia.*

Rays neutral or wanting.

Heads discoid.............. *Eleutheranthera.*

Heads radiate.

Rays white.................. *Montanoa.*

Rays yellow.

Heads large, 5–14 cm. wide or broader.

Peduncles fistulose; native plants. *Tithonia.*

Peduncles not fistulose; cultivated plants............... *Helianthus.*

Heads much smaller; peduncles not fistulose.

Achenes each closely enclosed in a pale. *Sclerocarpus.*

Achenes not closely enclosed in the pales.................. *Viguiera.*

VI. HELENIEAE

Heads discoid; plants glabrous........................*Porophyllum.*

Heads radiate; plants often pubescent.

  Phyllaries imbricate, numerous, in 2 or more series; disk globose; leaves alternate..................................*Helenium.*

  Phyllaries in a single series or, if somewhat imbricate, only 5; disk not globose; leaves all or chiefly opposite.

    Ray achenes compressed and concave, dentate on the margins; pappus none.................................*Galeana.*

    Ray and other achenes neither compressed nor concave, not dentate; pappus present.

      Pappus setose, the setae sometimes reduced to squamellae. *Pectis.*

      Pappus of paleae, these often dissected or awned.

        Pappus squamellae dissected into bristles; leaves not pinnatifid..................................*Dyssodia.*

        Pappus squamellae not dissected; leaves usually pinnatifid. *Tagetes.*

VII. ANTHEMIDEAE

Receptacle paleaceous....................................*Achillea.*

Receptacle not paleaceous.

  Heads discoid, greenish...............................*Artemisia.*

  Heads radiate, usually yellow with white rays, or the rays sometimes colored.

    Achenes equally or irregularly 5–10-costate....*Chrysanthemum.*

    Achenes 3–5-costate on the inner surface, ecostate dorsally. *Matricaria.*

VIII. SENECIONEAE

Phyllaries multiseriate, imbricate, the outer ones shorter.

  Leaves alternate, at least the lower ones lobate......*Neurolaena.*

  Leaves opposite, not lobate.

    Receptacle naked; usually shrubs, often epiphytic; rays yellow. *Liabum.*

    Receptacle paleaceous; herbs; rays white.....*Schistocarpha.*

Phyllaries 1-seriate or nearly so, subequal, or graduated only in *Gynura* (cultivated).

  Pistillate flowers in several series; heads disciform; plants herbaceous, with greenish or bright pink or purple flowers.*Erechtites.*

  Pistillate flowers in a single series.

Style branches with long, subulate, hirtellous appendages; cultivated plants . . . . *Gynura.*

Styles branches truncate or with short appendages.

Heads red, pink, or orange; small, annual herbs . . . . *Emilia.*

Heads yellow or white, rarely orange; perennial herbs, shrubs, or trees . . . . *Senecio.*

IX. CALENDULEAE

A single (cultivated) genus in Costa Rica . . . . *Dimorphotheca.*

X. CYNAREAE

A single genus in Costa Rica . . . . *Cirsium.*

XI. MUTISIEAE

Plants acaulescent, the leaves all basal.

Cultivated plants . . . . *Gerbera.*

Native plants . . . . *Chaptalia.*

Plants with leafy stems.

Heads yellow or whitish.

Heads yellow; involucre double; leaves pinnate-nerved . . *Trixis.*

Heads whitish; involucre nearly 1-seriate; leaves palmate-nerved . . . . *Jungia.*

Heads purple, crimson, or reddish.

Leaves entire; shrubs . . . . *Lycoseris.*

Leaves dentate and often lobate; large herbs . . . . *Onoseris.*

XII. CICHORIEAE

Stems scapose, each bearing a single head; leaves all basal. *Taraxacum.*

Stems more or less leafy, usually with several heads.

Pappus setae plumose . . . . *Hypochaeris.*

Pappus setae not plumose.

Achenes compressed.

Achenes truncate, not rostrate . . . . *Sonchus.*

Achenes rostrate or narrowed at the apex . . . . *Lactuca.*

Achenes terete or prismatic, not compressed.

Achenes truncate at the apex . . . . *Hieracium.*

Achenes narrowed at the apex . . . . *Crepis.*

ACHILLEA L. Yarrow

Perennial herbs with erect, leafy stems; leaves mostly pinnatifid and finely dissected, alternate; flower heads small, radiate, in terminal corymbs; involucre obovoid or campanulate, the phyllaries appressed, imbricate in few series, the outer ones shorter; receptacle flat or convex, paleaceous; ray flowers white or purple, pistillate, fertile; disk flowers perfect, fertile, the corollas white; achenes oblong or obovate, subcompressed; pappus none.—No species are native in Central America.

Achillea Millefolium L. Naturalized on banks in the potreros of Volcán de Turrialba; cultivated for ornament in gardens of the Meseta Central. Native of the Old World, but widely naturalized in temperate North America. Plants mostly 60 cm. high or less, generally simple below, abundantly pilose; leaves plumelike, divided into very numerous small, narrow segments; heads numerous, 4–6 mm. broad, forming a compact corymb, the rays 4–6, scarcely 4 mm. long. Normally the rays are white, but especially in the cultivated forms they are frequently pink or purple.

Achyrocline rufescens DC. was reported by Klatt from forests of Alto del Roble on the basis of *Pittier 214.* I have not seen this collection, and no material of the genus is available from Costa Rica. It is rather probable that the Costa Rican plant is a *Gnaphalium,* although the genus is represented both north and south of Costa Rica, and may well occur here.

AGERATUM L.

Reference: Robinson, Revision of the genus *Ageratum,* Proc. Amer. Acad. 49: 454. 1913.

Annual or perennial herbs, rarely suffrutescent; leaves mostly opposite, broad, crenate or serrate; inflorescence usually terminal and cymose or corymbose, the heads discoid; involucre campanulate, the phyllaries narrow, subequal, 2–3-seriate, imbricate, mostly 2-costate; receptacle plane or convex, naked or paleaceous; achenes 5-angulate, prismatic; pappus of distinct or connate, setiferous or muticous scales, sometimes an entire or dentate crown.—Other species are known from Central America. Some species of the genus often are planted for ornament in the United States and other regions.

Ageratum conyzoides L. *Santa Lucía.* Known in Costa Rica only from the region of Cartago, 1,200–1,400 meters, but to be expected elsewhere. Widely distributed in the American tropics, and introduced in the Old World. Plants annual, commonly 60 cm. high or less, the stems usually purplish; leaves petiolate, obtuse, rounded to short-cuneate at the base, crenate, sparsely pilose; heads pedicellate, 6 mm. broad, the phyllaries subabruptly acuminate, ciliate, usually erose below the apex, sparsely pilose or glabrate outside; corollas blue-purple; pappus scales 5, lanceolate, setiferous, distinct. A rather showy and handsome plant, in general appearance exactly like *Alomia microcarpa*, with which it often is confused by collectors. In *Alomia* the achenes bear no pappus. In some parts of Central America *A. conyzoides* is a common weed.

Ageratum Houstonianum Mill. Reported from San Rafael de Cartago, and to be expected elsewhere. Extending to Mexico and West Indies. In general appearance very similar to *A. conyzoides;* leaves hirsute; phyllaries entire, gradually long-attenuate, glandular-puberulent and hirsutulous.

Ageratum latifolium Cav. Reported from hedges at Turrialba, 200 meters, *Tonduz 4139.* Mexico to Peru and West Indies. Plants annual, erect or decumbent; leaves ovate or ovate-oblong, 2–5 cm. long, obtuse, rounded at the base, crenate-serrate; heads 5–8 in each corymb, 6 mm. broad, the phyllaries lance-oblong, acute, subglabrate; corollas violaceous or white; pappus scales oblong or lanceolate, distinct, muticous.

Ageratum Oerstedii Robinson, Proc. Amer. Acad. 49: 472. 1913. *Coelestina latifolia* Benth. in Oerst. Vid. Medd. Kjoebenhavn 71. 1852. *Carelia latifolia* Kuntze, Rev. Gen. 1: 325. 1891. Monte Aguacate, 600 meters, *Oersted 251.* Collected also near San Ramón. Endemic. Plants annual, 30–50 cm. high; leaves petiolate, ovate or ovate-oblong, 4–7 cm. long, obtuse or obtuse-acuminate, abruptly contracted at the base, crenate, sparsely pilose; heads few, 7.5 mm. broad, the phyllaries attenuate, sparsely hirtellous or glabrate; achenes glabrous, black, the pappus minute, coroniform, dentate.

Ageratum riparium Robinson, Proc. Amer. Acad. 49: 473. 1913. In sand along Río Ceibo, *Pittier 4914.* Known only from the original collection. Leaves ovate, about 8 cm. long, obtuse-acuminate, narrowed and unequal at the base, undulate, scaberulous above, pilosulous beneath, especially on the veins; heads 4–8 in each corymb, 7 mm. long, the inner ones attenuate, the outer callose-obtuse, ciliate between the costae, otherwise glabrous; corollas white, glabrous; achenes glabrous or nearly so; pappus a 5-lobate crown, the lobes muticous. Material of this species was referred incorrectly by Klatt to *A. tomentosum* Hemsl.

Ageratum scabriusculum (Benth.) Hemsl. Region of San Ramón, in pastures or along roadsides, about 900 meters. Ranging to Mexico. Perennial, less than a meter high; leaves ovate, 2–5 cm. long, acuminate, serrate, lustrous above, scaberulous or minutely pilosulous, appearing glabrous; heads 3–7 in a corymb, 7 mm. long, the phyllaries very acute, crisp-puberulent or almost glabrous; corollas glabrous; achenes glabrous; pappus crateriform, usually 5-dentate, scarcely 0.3 mm. long. The type locality is given by Robinson as Costa Rican, but it is actually Nicaraguan.

Ageratum tomentosum (Benth.) Hemsl. Biol. Centr. Amer. Bot. 2: 82. 1881. *Coelestina tomentosa* Benth. in Oerst. Vid. Medd. Kjoebenhavn 71. 1852. *Carelia tomentosa* Kuntze, Rev. Gen. 1: 325. 1891. Candelaria, 1,500 meters, *Oersted.* Extending to Mexico. Perennial, often suffrutescent; leaves ovate or deltoid, 2–3.5 cm. long, obtuse, crenate, rounded or truncate at the base and often short-decurrent, densely pale-tomentose beneath; corymbs long-pedunculate, the heads 5 mm. long, the phyllaries narrowly lanceolate, tomentulose; corollas hispidulous toward the apex; achenes glabrous; pappus coroniform.

ALOMIA HBK.

Reference; Robinson, Revision of the genus *Alomia,* Proc. Amer. Acad. 49: 438. 1913.

Annual or perennial herbs, rarely suffrutescent, in general appearance exactly like *Ageratum;* leaves mostly ovate or rhombic and petiolate, thin, serrate or dentate; heads small, corymbose or paniculate, discoid, many-flowered; involucre campanulate or subturbinate, the phyllaries subequal, biseriately imbricate, lance-linear, acute, 1–3-costate, sometimes very unequal and in more numerous series; receptacle plane or conic, naked or paleiferous; corollas white to pink or purple; achenes prismatic, 5-angulate, glandular-atomiferous or hispidulous, sometimes glabrous, dark, the pappus very short and annular or none.—At least three other species are known from Central America, in Guatemala and Panama.

Alomia microcarpa (Benth.) Robinson, Proc. Amer. Acad. 49: 452. 1913. *Santa Lucía. Coelestina microcarpa* Benth. in Oerst. Vid. Medd. Kjoebenhavn 72. 1852. *Ageratum microcarpum* Hemsl. Biol. Centr. Amer. Bot. 2: 82. 1881. In grassy places, Cartago, *Oersted 10968.* Abundant in fields and pastures of the central region, mostly at 1,000–1,500 meters; region of San Ramón; El General. Reported doubtfully from Venezuela. An erect or decumbent annual, usually about 50 cm. high, soft-pilose; leaves opposite, petiolate, deltoid-ovate, 3–6 cm. long, obtuse or subacute, cordate or subcordate at the base, crenate-serrate, pilose; heads numerous in each corymb, about 60-flowered, the phyllaries pilose; achenes black, glabrous, 1 mm. long; corollas blue-purple. Forma *Torresii* Standl. (Field Mus. Bot. 11: 274. 1936; La Pitahaya, Cartago, *Rubén Torres Rojas 196*) is a form with white flowers. Santa Lucía is one of the best known plants of central Costa Rica. It is especially abundant in the pastures around or above Cartago, some of which present solid masses of beautiful, clean color that are visible from a long distance.

ARCHIBACCHARIS Heering

Reference: Blake, *Hemibaccharis*, a new genus of Baccharidinae, Contr. U. S. Nat. Herb. 20: 543. 1924.

Herbs or usually shrubs, often somewhat scandent, polygamo-dioecious; leaves alternate; heads small, whitish, discoid, cymose-paniculate, the pistillate bearing one or more central hermaphrodite flowers, the staminate often with a few marginal pistillate flowers; involucre 3–5-seriate, the phyllaries graduated, imbricate, linear to ovate, narrowly scarious-marginate; receptacle rather flat; achenes compressed and 2-nerved, hispidulous; pappus setose, 1-seriate.—At least three other species occur in Central America. The genus is closely related to *Baccharis*.

Archibaccharis irazuensis Blake, Journ. Wash. Acad. Sci. 17: 60. 1927. *Hemibaccharis irazuensis* Blake, Contr. U. S. Nat. Herb. 20: 551. 1924. Laguna del Reventado, Volcán de Irazú, 2,300 meters, *Pittier 14079*. Occasional in mountain forests of the central region, ascending to 3,000 meters; also in the region of San Ramón, 1,000 meters. Endemic. A subscandent shrub, the branches short-pilose; leaves short-petiolate, lance-ovate or lance-elliptic, 4–8 cm. long, acuminate, cuneate at the base, mucronate-denticulate, pilosulous on both surfaces; panicles small and dense, rounded; heads 4.5–5 mm. high, the phyllaries ciliate, the outer ones puberulous; achenes 1.2 mm. long.

Archibaccharis torquis Blake, Contr. U. S. Nat. Herb. 23: 1508. 1926. *Hemibaccharis torquis* Blake, op. cit. 20: 550. *pl. 51.* 1924. San José, *Tonduz 1535*. Frequent in thickets and forests of the Meseta Central; regions of Dota and San Ramón, and widely distributed on the Pacific slope, mostly at 900–1,400 meters. Extending to southern Mexico. A shrub of 1–3 meters, often subscandent, the branches somewhat zigzag, puberulent or pilosulous; leaves short-petiolate, oval or ovate-oval, 3–8 cm. long, acute or short-acuminate, rounded or cuneate-rounded at the base, remotely dentate or denticulate, glabrate but pilosulous beneath, chiefly on the nerves; panicles small and rounded, about 5 mm. wide, the heads dirty white, 4–5 mm. long; achenes 0.8 mm. long. Material of this species has been reported incorrectly under the name *Conyza asperifolia* Benth. & Hook.

ARTEMISIA L.

Aromatic herbs or shrubs, the leaves alternate, often lobate or pinnatifid; heads small, discoid, racemose-spicate or paniculate, greenish or yellowish; involucre usually hemispheric, the phyllaries imbricate in few series, the outer gradually shorter; receptacle flat to hemispheric, naked or pubescent; achenes small, obovoid or oblong, 2-costate; pappus none.—No species are native in Central America, but several are found in Mexico. *Artemisia Absinthium* L. of Europe is the source of the liquor absinth.

Artemisia vulgaris L. *Ajenjo.* Often planted in gardens of the temperate region. Native of Europe. An erect, perennial herb, less than a meter high; leaves deeply pinnatifid into linear or oblong segments, glabrate above, densely white-tomentose beneath. An infusion of the plant is used locally in domestic medicine as a tonic, febrifuge, anthelmintic, and emmenagogue.

ASTER L.

Perennial or rarely annual herbs, usually branched, with alternate leaves; heads radiate, corymbose or paniculate; involucre hemispheric to turbinate, the phyllaries imbricate in several series, the outer ones usually much shorter; receptacle flat or convex; rays mostly white, blue, or purple, pistillate, the disk flowers perfect, usually yellow; achenes commonly compressed and nerved; pappus bristles numerous, slender, scabrous or denticulate, normally 1-seriate.—Several other species are native in Central America.

Aster exilis Ell. Common about San José, and probably in other places in the central region, at 1,100–1,300 meters; usually growing at the edges of streams. Widely distributed in tropical America. Plants annual, commonly 60 cm. high or less, often much branched, glabrous, somewhat succulent; leaves linear or linear-lanceolate, 3–10 cm. long, entire or nearly so, sessile, acute or acuminate, the leaves of the branches subulate; heads numerous, paniculate; involucre 6 mm. high, the phyllaries linear-subulate, appressed; rays purplish, 4 mm. long; achenes pubescent. A common and rather weedy plant in many parts of Central America. Costa Rican material was referred by Klatt to *A. pauciflorus* Nutt.

Aster laevis L. *Lila.* Cultivated for ornament in gardens of the Meseta Central and elsewhere. Native of temperate North America. Plants perennial, stout, erect, in cultivation about 50 cm. high, glabrous; upper leaves sessile and usually cordate-amplexicaul, lanceolate to ovate, the lower borne on winged petioles; rays blue or violet; heads as much as 2.5 cm. broad; achenes glabrous or nearly so. This is a common garden plant in many parts of Central America. Britton uses for the cultivated plant the name *Aster versicolor* Willd., based upon cultivated material, which, however, is believed to be a derivative of the common *A. laevis* of the United States.

Aster spinosus Benth. *Manzanilla.* Common on *arenales* (sandbars) about San José, and doubtless elsewhere on the Pacific slope. Ranging to southwestern United States. Plants perennial, 1 meter high or less, usually forming dense, broad clumps, glabrous, the stems pale, angulate, armed with long, stout, stiff spines; flower heads small, the rays white; leaves mostly linear, often early deciduous. Easily recognized in the genus by its abundant spines. The plant almost invariably, in Central America, grows along stream beds.

BACCHARIS L.

Dioecious shrubs or small trees; leaves alternate; heads discoid, small, paniculate or corymbose; involucre campanulate or oblong, the phyllaries numerous, imbricate in several series, the outer ones shorter; receptacle flat, naked; achenes somewhat compressed, costate; pappus of the fertile flowers copious, capillary, soft, that of the sterile flowers short.—A few other species are found in northern Central America. The genus is a vast one, most abundantly developed in South America, but with many species also in Mexico.

Baccharis Braunii (Polak.) Standl., comb. nov. *Eupatorium Braunii* Polak. Linnaea 41: 576. 1877. *B. splendens* Heering, Schr. Nat. Ver. Schleswig Holst. 13: 48. 1906 (Río Ceibo, near Buenos Aires, *Pittier 4932*). Sandy slopes, Angostura, *Polakowsky 508.* Occasional in mountain forests of the central region; region of San Ramón; mostly at 1,000–1,400 meters. Honduras to Panama. A shrub of 1.5–3 meters, glabrous throughout; leaves petiolate, oblong-elliptic, mostly 3–4.5 cm. wide, acute at each end, entire, conspicuously 3-nerved, lustrous and very glutinous on the upper surface; heads small, mostly long-pedunculate, forming large, broad corymbs. Costa Rican material of this shrub was referred by Klatt to *B. nervosa* DC.

Baccharis trinervis (Lam.) Pers. *Alcotán, Santo Domingo.* Frequent in thickets or hedges, Meseta Central and surrounding mountains, descending to the upper Atlantic tierra caliente and to the Pacific coast; Guanacaste; sometimes ascending to 1,800 meters, but chiefly at much lower elevations. Widely distributed in tropical America. A much branched shrub of 3 meters or less, the branches usually recurved and sometimes subscandent; branches glabrous or nearly so; leaves on very short petioles, elliptic to lance-oblong, mostly 2 cm. wide or less, acute or acuminate, entire, conspicuously triplinerved; flower heads about 4 mm. high, dirty white, in small or large panicles. *B. trinervis* var. *rhexioides* (HBK.) Baker is a form in which the branches and the veins of the lower leaf surface are tomentulose or puberulous. It grows in association with the more glabrate plants, and probably is scarcely worthy of special nomenclatorial designation. The shrub is a very common one in many parts of the Pacific slope, and is a most unattractive one in appearance. Pittier reports the Térraba name as Zbin-kor-gá. The fresh leaves are applied as poultices to aid in the healing of sores.

BALTIMORA L.

Erect, usually much branched annuals, scabrous-pubescent; leaves opposite, petiolate, crenate-dentate; heads rather small, yellow, forming a broad panicle; involucre campanulate, the phyllaries few, biseriate; receptacle flat, paleaceous; disk flowers sterile, the ray flowers perfect, fertile; achenes triquetrous, truncate, the pappus short, cuplike, dentate, deciduous.—No other species is found in Central America.

Baltimora recta L. Collected at Jesús María, San José, and Bebedero (Guanacaste), and doubtless to be found in many other localities. Widely distributed in tropical America. Plants slender and low, or sometimes coarse and as much as 2.5 meters high; leaves broadly ovate, acute or acuminate; heads 5 mm. high, the phyllaries broad, acuminate, strigose, the rays long and narrow; achenes glabrous, smooth or somewhat tuberculate. This is said to be a good honey plant. It is a common weed in many parts of Central America.

BELLIS L. Daisy

Low, cespitose herbs, the stems usually scapose, the leaves mostly basal; heads radiate, the rays white or pink, the disk yellow; involucre hemispheric or broadly campanulate, the phyllaries narrow, herbaceous, subequal, in 1–2 series; receptacle naked; achenes compressed, obovate; pappus none or a ring of minute bristles.—No species of the genus is native in Central America.

Bellis perennis L. Common in meadows high on the slopes of Irazú and Turrialba, abundant in many localities. Native of Europe. A cespitose perennial, the scapose stems mostly 10 cm. high or less, pubescent; leaves basal, obovate, obtuse, obscurely dentate, 2.5–5 cm. long, pubescent; involucre about 7 mm. wide, the rays white or pink, the phyllaries usually purple. The English daisy, a highly esteemed garden plant, has become thoroughly naturalized in the potreros of the dairy districts of the central volcanoes. The cool, moist climate seems to be exactly suited to the plants, which are a beautiful sight in these meadows. The plants no doubt were introduced by accident with grass seed.

BIDENS L.

Reference: Sherff, The genus *Bidens*, Field Mus. Bot. 16. 1937.

Annual or perennial herbs, sometimes scandent and somewhat suffrutescent; leaves chiefly opposite, serrate, simple or variously divided or dissected; heads rather large, radiate or discoid, the rays yellow or white; involucre campanulate to oblong, the phyllaries biseriate, distinct or slightly united at the base, the outer ones often foliaceous; receptacle flat or nearly so, paleaceous; disk flowers perfect and fertile; achenes flat, quadrangular, or almost terete, linear to cuneate or oblong; pappus of 2–6 teeth or subulate awns, the awns barbate or hispid.—A few other species probably are found in Central America.

Bidens ostruthioides (DC.) Schultz Bip. var. **costaricensis** (Benth.) Sherff, Bot. Gaz. 88: 298. *pl. 21.* 1929; Field Mus. Bot. 16: *pl. 132.* *B. costaricensis* Benth. in Oerst. Vid. Medd. Kjoebenhavn 94. 1852. *B. irazuensis* Calv. & Calv. Year C. R. Nat. Hist. 137, 140. *ill.* 1917, nomen. Monte Aguacate, 600–1,500 meters, *Oersted* (photo. of type in Herb. Field Mus.). Also on the slopes of Irazú, chiefly at 2,000–4,000 meters, where apparently plentiful. Southern Mexico. Plants probably suffrutescent at the base; leaves bipinnatisect, the segments cuneate-lanceolate, incised-dentate, glandular-setulose above, pale beneath; outer phyllaries 5–7, foliaceous, lanceolate or broadly linear; rays yellow, 15–22 mm. long; achenes linear, glabrous, 7–9 mm. long, 3-aristate, the awns retrorse-barbate. The typical form of *B. ostruthioides* is found in Mexico and Guatemala.

Bidens pilosa L. *Mozote, Moriseco, Mozotillo.* Occasional in waste ground or thickets, Meseta Central to the coasts. Widely distributed in the tropics of both hemispheres. An erect, branched annual, usually a meter high or less; leaves slender-petiolate, simple or mostly 3–5-parted, thin, serrate, pilose; heads discoid, at anthesis 5–7 mm. long; outer phyllaries 7–9, linear or linear-spatulate, ciliate, 4–5 mm. long; achenes linear, glabrous below, tuberculate-strigose above, 4–16 mm. long, the awns retrorse-barbate. A common and disagreeable weed in many parts of Central America. The achenes adhere tenaciously to clothing by means of the barbate awns. The species, as treated by Sherff at least, is a highly variable one. Represented in Costa Rica are the following variants, of greater or minor importance: var. *minor* (Blume) Sherff, the heads radiate, the yellowish or whitish rays only 4–8 mm. long; var. *radiata* Schultz Bip., the heads radiate, the heads at anthesis 1.5–3 cm. broad, the rays white, larger; var. *calcicola* (Greenm.) Sherff, the heads radiate, in anthesis 1–1.5 cm. broad.

Bidens riparia HBK. Region of Nicoya. Southern Mexico to Peru and Brazil. An annual, 30–50 cm. high, the stems branched, glabrous; leaves bipinnate, pilosulous above, glabrous beneath, the segments ovate or lanceolate, dentate and incised-lobate; heads in anthesis 4–6 mm. long, the rays 3–5 mm. long, yellowish white; outer phyllaries 7–13, linear, 6–10 mm. long, glabrous or nearly so; achenes linear, curved, 10–15 mm. long, the short awns retrorse-barbate.

Bidens squarrosa HBK. *Mozotillo, Barbasco, Mozote.* Frequent in thickets, Meseta Central to the Pacific coast; Guanacaste; regions of Dota and San Ramón. Mexico to Bolivia and Brazil. A suffrutescent or herbaceous vine, sometimes 3.5 meters long or more, the stems glabrous or tomentose; leaves pinnately 3–5-parted, the divisions ovate to lance-oblong, acute or acuminate, serrate, pubescent or glabrate; heads numerous, usually paniculate, radiate, at anthesis 1.5–4 cm. wide, 6–8 mm. long; involucre hispid or glabrate, the outer phyllaries 4–6, linear, 3–5 mm. long; rays bright yellow, 8–15 mm. long; achenes linear, 6–9 mm. long, the awns retrorse-barbate or naked. A very showy and handsome plant when in flower. Material of this species has been referred by various authors to *B. floribunda* HBK. and *B. rubifolia* HBK. *Solís 460*, from Hacienda Montecristo, was referred by Sherff to *B. segetum* Mart., this being the only record of its occurrence north of Brazil. As may be seen by inspection of Sherff's key to species, where *B. segetum* and *B. squarrosa* appear side by side, the differences, if any, between the two species are rather indefinite. It seems more in accordance with the probable facts, therefore, to refer the Solís collection to *B. squarrosa.*

Bidens tenera O. E. Schulz, Bot. Jahrb. 50: Suppl. 186. 1914; Sherff, Field Mus. Bot. 16: *pl. 103, f. i–c.* Forests of Boruca, *Pittier 4528.* Pacific tierra caliente. Colombia to Brazil. A slender annual, 35 cm. high or less, the stems glabrate, simple or sparsely branched; leaves simple or 3-foliolate, the segments thin, ovate or ovate-lanceolate, acuminate, serrate, sparsely short-pilose above; heads few, discoid, few-flowered; involucre hispid at the base, the outer phyllaries about 4, linear or linear-spatulate, 4 mm. long; achenes linear, straight or slightly curved, glabrous, 12–15 mm. long, the awns retrorse-barbate.

BRICKELLIA Ell.

Reference: Robinson, A monograph of the genus *Brickellia,* Mem. Gray Herb. 1. 1917.

Herbs or shrubs; leaves opposite or alternate, sessile or petiolate; heads discoid, usually paniculate, sometimes racemose, cymose, or corymbose, white or reddish; involucre cylindric or campanulate, the phyllaries numerous, striate, imbricate in several series, the outer shorter; receptacle naked; achenes prismatic, commonly 10-costate, mostly hispidulous, at least on the costae; pappus bristles 10–80, slender, almost smooth to subplumose.—A few other species are known from Central America.

Brickellia argyrolepis Robinson, Mem. Gray Herb. 1: 90. *f. 69.* 1917. In hedges, San Rafael, *Pittier 1980.* Frequent in thickets and hedges of the Meseta Central; region of Dota; at 1,100–1,800 meters. Endemic. A stout shrub 1–3 meters high; leaves opposite, short-petiolate, ovate, 4–6 cm. long, acute, rounded to subcordate at the base, serrulate, soft-tomentose beneath and pale; heads 2 cm. long, glomerate at the ends of the branches, greenish white, the phyllaries silvery-sericeous; achenes 5.5 mm. long. This plant was reported from Costa Rica by Klatt as *B. Hartwegii* Gray.

Brickellia diffusa (Vahl) Gray. Occasional in waste ground or thickets, Meseta Central to the Pacific coast; Guanacaste. Widely distributed in tropical America. A slender, usually much branched, erect annual, sometimes 2 meters high, sparsely puberulent or glabrate; leaves slender-petiolate, orbicular-ovate or deltoid-ovate, 4–6 cm. long, acuminate, serrate or crenate-dentate; pedicels filiform, the very numerous heads whitish, about 8-flowered, 8 mm. long; achenes 1.5–2 mm. long, villous above. A common weed in places along the Pacific slope of Central America.

CALEA L.

Reference: Robinson & Greenman, Revision of the Mexican and Central American species of the genus *Calea*, Proc. Amer. Acad. 32: 20–30. 1896.

Usually densely branched, low shrubs; leaves opposite, mostly dentate or crenate; heads rather small, radiate or discoid, usually cymose or umbellate, the rays yellow or white; involucre several-seriate, graduate, the phyllaries dry or the outer sometimes herbaceous; rays, when present, fertile; achenes subterete or 4–5-angulate; pappus persistent, of 4–20 usually equal, paleaceous squamellae or awns, rarely none.—A few other species grow in northern Central America.

Calea dichotoma Standl., sp. nov.—Frutex, ramis gracilibus brunnescentibus subteretibus ubique aequaliter repetite dichotomis, internodiis plerumque foliis brevioribus subsparse puberulis vel glabratis; folia parva breviter petiolata subcoriacea, petiolo puberulo vix ad 3 mm. longo; lamina ovata vel lanceolato-ovata 1.3–3 cm. longa 6–16 mm. lata anguste longiacuminata, basi longiuscule acute decurrens, grosse adpresso-serrata, supra sparse scaberula vel fere omnino glabra, subtus paullo pallidior dense impresso-puncticulata ad nervos hinc inde pilis paucis brevibus conspersa vel fere glabra, e basi solemniter trinervia, nervis valde elevatis; capitula discoidea ad apices ramorum umbellata, vulgo 3–5, pedicellis gracilibus puberulis vix ultra 6 mm. longis, capitulo e quaque axilla ramorum nascente solitario longius pedicellato; involucrum ca. 5 mm. longum anguste campanulatum basi rotundatum, phyllariis ca. 3-seriatis latis apice rotundatis minute ciliatis aliter glabris, pallidis, extimis brevissimis; achaenia immatura fusca ca. 2.5 mm. longa sparse hispidula, pappi squamis ca. 8 anguste oblongo-lanceolatis pallidis acutis imbricatis 1.5 mm. longis.—Maderal de San Mateo, October, 1922, *Brenes 3665* (type in Herb. Field Mus.). In appearance the plant is unique because of its regularly dichotomous branching. Noteworthy, too, are the very small leaves, which, however, may not furnish a constant character for separation. Except for its mode of branching, the plant suggests *C. Zacatechichi.*

Calea Pittieri Rob. & Greenm. Proc. Boston Soc. Nat. Hist. 29: 105. 1899. Río Ceibo, near Buenos Aires, 200 meters, *Pittier 4913.* Also at Boruca, and apparently frequent in the region of San Ramón, as well as elsewhere on the Pacific slope; El General; Cartago; at 1,400 meters or less. Endemic. A shrub of 1–3 meters; leaves ovate to elliptic, mostly 3.5–6 cm. long, acute to obtuse, thick, crenate-serrate, rugose and very scabrous above, grayish-tomentose beneath or hispidulous, 5-nerved from near the base; heads discoid, slender-pedicellate, umbellate; pappus awns about 20, longer than the achene. Material of this species was referred by Klatt to *C. prunifolia* HBK., of Panama and South America.

Calea urticifolia (Mill.) DC. *Jalacate, Jaral. C. pellucidinerva* Klatt, Bull. Soc. Bot. Belg. 31, pt. 1: 207. 1892 (Térraba, 260 meters, *Pittier 3707*). Frequent in pastures and thickets of the Meseta Central, often occurring in great abundance, also in many parts of the Pacific slope; region of San Ramón; at 1,400 meters or less. Panama to southern Mexico. A dense shrub, usually 1–1.5 meters high or lower; leaves ovate, 5–12 cm. long, acute, coarsely serrate, usually rugose, very scabrous above and often rough-pubescent beneath; heads almost 1 cm. long, the short rays yellow; achenes 2.5 mm. long, the pappus 3.5 mm. long. The plant sometimes becomes a rather bad weed in pastures, especially in the Cartago region. It is a showy and rather handsome shrub when in flower. Costa Rican material has been referred to *C. axillaris* DC., which is now considered a variety of *C. urticifolia.*

Calea Zacatechichi Schlecht. Region of San Ramón, 700–800 meters. Ranging to Guatemala and Mexico. A much branched shrub, pubescent or almost glabrous; leaves ovate or triangular-ovate, 2–6 cm. long, coarsely dentate, acute or acuminate, somewhat rugose; heads small, about 12-flowered, forming dense, umbellate-cymose panicles, the pedicels mostly shorter than the heads; rays none; pappus shorter than the achene. Costa Rica has not been included previously in the range of *C. Zacatechichi,* but four collections from San Ramón agree very well with material from northern Central America, and probably are to be referred here. The species name is of Aztec origin, signifying "bitter grass." In Mexico the plant has long been used in domestic medicine.

CALYPTOCARPUS Less.

Low annuals, prostrate or ascending, pubescent, branched; leaves small, opposite, dentate; heads small, yellow, radiate, axillary, usually short-pedunculate; phyllaries few, herbaceous; ray flowers pistillate, perfect, the disk flowers perfect and fertile; achenes of the ray and disk alike, or the ray achenes sometimes 3-angulate, not winged; pappus of 2–3 stout, hard, spinose awns.—A single species is found in Central America. The generic name often is written incorrectly as *Calyptrocarpus*.

Calyptocarpus vialis Less. *Espinillo, Cabeza de vaca, Chiquisá. C. Wendlandii* Schultz Bip. Bot. Zeit. 24: 165. 1866 (San José, *Wendland 1078*). *Synedrella vialis* Gray. Waste or cultivated ground, Meseta Central. Widely distributed in tropical America. Plants branched from the base, the stems 30 cm. long or less; leaves ovate, 1–3 cm. long, acute, cuneate to subcordate at the base, thinly appressed-pilose, petiolate; involucre narrow, about 7 mm. long, the phyllaries green, imbricate, the rays short and inconspicuous; achenes about 5 mm. long.

CHAPTALIA Vent.

Scapose, perennial herbs; leaves floccose-tomentose, entire to lobate; heads radiate, solitary at the end of a long, naked scape; involucre turbinate-campanulate, many-flowered, the phyllaries narrow, imbricate in few series, the outer shorter; rays pistillate, fertile, white to purple; disk flowers perfect, mostly neutral, their corollas somewhat bilabiate; achenes columnar or fusiform, 5-nerved; pappus of numerous long, soft bristles.—A single species grows in Central America.

Chaptalia nutans (L.) Polak. Common on open banks or in pastures, Meseta Central, and probably elsewhere. Widely distributed in tropical America. Leaves mostly lyrate-lobate, sometimes entire, 8–25 cm. long, obtuse, green and almost glabrous above, densely white-tomentose beneath, thin; scapes 30–60 cm. high, slender, floccose-tomentose; heads 2–2.5 cm. long, purple or dark red; achenes 5 mm. long, glabrate or glandular, the filiform beak 2–3 times as long; pappus yellowish, 10–13 mm. long. A common and rather weedy plant, generally distributed in Central America. Costa Rican material was referred by Klatt to *C. albicans* (Sw.) Northrop, a West Indian species.

CHRYSANTHELLUM Rich.

Glabrous annuals, usually much branched and diffuse or almost prostrate; basal leaves mostly incised-dentate, the cauline ones alternate and various divided; heads small, radiate, pedunculate, terminal or arising from the upper leaf axils; ray flowers yellow, pistillate, the disk flowers perfect; involucre campanulate, the phyllaries 1–2-seriate, membranaceous; receptacle plane, paleaceous; achenes linear-oblong, dorsally compressed, the outer ones with obtuse margins, the inner winged; pappus none.—No other species are found in Central America.

Chrysanthellum integrifolium Steetz. El Rodeo, Villa Colón, 840 meters, *M. Valerio 950.* Widely distributed in tropical America, but uncommon in Central America; growing in savannas or pastures. Plants slender, often prostrate; leaves oblong to spatulate and serrate, somewhat succulent, or often pinnatifid; heads scarcely 1 cm. broad, terminating very long, slender peduncles; outer phyllaries with scarious margins.

CHRYSANTHEMUM L.

Annual or perennial herbs; leaves alternate, dentate to dissected; heads large, mostly long-pedunculate, radiate; involucre usually hemispheric or depressed, the phyllaries appressed, imbricate in several series, the outer ones shorter; receptacle flat to hemispheric, naked; ray flowers pistillate, fertile, the disk flowers perfect and fertile; achenes angulate or terete, 5–10-costate; pappus none or a short cup.—No species of the genus are native in Central America.

Chrysanthemum coronarium L. *Conchita.* Cultivated for ornament in gardens of the temperate region. Native of Europe. A tall, branched, almost glabrous annual with bipinnatifid leaves and pale yellow rays.

Chrysanthemum indicum L. *Crisántemo.* The common chrysanthemum, native of China and Japan, is grown commonly in gardens of the temperate region, especially about San José, and in innumerable forms. The plants thrive here, and flowers grown out of doors during the dry season compare not unfavorably in size with those produced in greenhouses of the North.

Chrysanthemum lacustre Brot. *Margarita grande.* Often grown for ornament in the temperate region. Said to be native of Portugal. A tall, much branched perennial; leaves ovate-lanceolate to linear-lanceolate, dentate; heads very large, with long, white rays.

Chrysanthemum Leucanthemum L. *Margarita.* Frequent in pastures on the slopes of Turrialba, Irazú, and Barba. Naturalized from Europe. An almost glabrous perennial, usually about 60 cm. high; basal leaves obovate or oblong, dentate or pinnatifid, the cauline leaves mostly amplexicaul, narrow, incised or dentate; heads long-pedunculate, 2.5–3 cm. broad, with 20–30 long, white rays. The ox-eye daisy seems to thrive in the pastures of the volcanoes, to which it has been introduced with European grass seed. It is especially abundant on the upper slopes of Irazú.

Chrysanthemum Parthenium (L.) Pers. *Altamisa. Feverfew.* Often grown in gardens for ornament, and naturalized in many places, as at Escazú, in pastures, and about Cartago. Native of Europe. A cespitose perennial, 60 cm. high or less, strong-scented; leaves pinnately parted into ovate or oblong, incised or pinnatifid segments; heads numerous, small, forming dense, terminal corymbs, the disk scarcely 1 cm. broad, the short rays white.

CIRSIUM Mill. Thistle

Reference: Petrak, Beih. Bot. Centralbl. 27, pt. 2: 207. 1910.

Coarse, perennial or biennial herbs, usually very prickly; leaves basal and cauline, the cauline ones alternate, variously lobate or pinnatifid; heads large, many-flowered, discoid, mostly white, pink, yellowish, or purple; involucre ovoid or globose, the phyllaries imbricate in numerous series, often tipped with prickles; receptacle flat or convex, setaceous; achenes obovate or oblong, compressed or obtusely 4-angulate, glabrous; pappus of several series of long, slender, plumose bristles.—A few other species are known from northern Central America.

Cirsium costaricense (Polak.) Petrak, Beih. Bot. Centralbl. 27, pt. 2: 219. 1910. *Cardo. Cnicus costaricensis* Polak. Linnaea 41: 581. 1878. Waste ground, San José, *Polakowsky 64* (photo. of type in Herb. Field Mus.). Frequent in waste ground or thickets of the central region; region of San Ramón; chiefly at 1,000–2,000 meters. Extending to Honduras. Plants stout, mostly 1–1.5 meters high; cauline leaves not or scarcely decurrent, spinose-dentate, sparsely arachnoid-tomentose above and green, densely white-tomentose beneath; heads in flower about 2 cm. long, rose-purple, the bracts tipped with long and slender, rather weak prickles.

Cirsium mexicanum DC. *C. mexicanum* var. *bracteatum* Petrak, Beih. Bot. Centralbl. 27, pt. 2: 231. 1910 (Tuis, 620 meters, *Pittier 11239*). Ascending to the Meseta Central, chiefly at 1,200 meters or less. Ranging to Mexico. Plants usually tall and stout, branched; leaves long-decurrent on the stems; heads purple, similar to those of *C. costaricense*, usually glomerate.

Cirsium pinnatisectum (Klatt) Petrak, Beih. Bot. Centralbl. 27, pt. 2: 236. 1910. *Cnicus pinnatisectus* Klatt, Bull. Soc. Bot. Belg. 35: 292. 1896. Páramos del Abejonal, 1,900 meters, *Tonduz 7791*. Collected also on Irazú, at 2,200 meters. Endemic. Plants about 2 meters high; leaves green above and arachnoid-tomentose, densely white-tomentose beneath, pinnatisect, very prickly; heads mostly solitary, declinate, about 7 cm. in diameter, yellowish; corolla lobes about equaling the tube.

Cirsium subcoriaceum (Less.) Petrak. *Cardo, Cardón.* Frequent in the central region, chiefly in the mountains, often growing in forest, mostly at 1,100–3,000 meters. Extending to Mexico. Plants 1–3 meters tall, branched; leaves not decurrent, green above, densely white-tomentose beneath, pinnatifid, very prickly; heads rose-red or yellowish, declinate, 4–6 cm. broad, the phyllaries tipped with short, stout prickles. A showy and rather handsome plant, plentiful at some places in the higher mountains, ascending to the upper slopes of Cerro de Las Vueltas.

CLIBADIUM L.

Reference: O. E. Schulz, Beiträge zur Kenntnis der Gattung *Clibadium*, Bot. Jahrb. 46: 613. 1912.

Shrubs or small trees, usually with very rough pubescence; leaves opposite, mostly ovate, serrate, triplinerved; heads very small, disciform, few–many-flowered, greenish or whitish, disposed in a subcorymbose panicle; involucre of 1–6 phyllaries, these ovate or rounded, concave, nerved; receptacle paleaceous near the margin, sometimes naked in the center; marginal flowers pistillate, fertile, the inner ones hermaphrodite, sterile; achenes obovoid, compressed, at maturity succulent and drupaceous; pappus none.—A few other species are found in Central America.

Clibadium acuminatum Benth. Bot. Voy. Sulph. 114. 1844. Cocos Island, *Barclay*. Endemic. Leaves petiolate, ovate, about 15 cm. long and 7 cm. wide, long-acuminate, duplicate-serrate, very scabrous with minute hairs on both surfaces, cuneate at the base; panicles lax, corymbiform, the branches divaricate; heads scarcely 4 mm. long, scabrous-puberulent; fertile flowers about 5; achenes obscurely puberulent at the apex.

Clibadium anceps Greenm. Proc. Amer. Acad. 39: 97. 1903. Forests of La Palma, 1,460 meters, *Tonduz 12537*. Also in the regions of San Ramón, Navarro, and El General, at 1,400 meters or less. Endemic. A small tree, the ultimate branches complanate, strigose; leaves ovate, 8–12 cm. long, 4–6 cm. wide, acuminate, cuneate at the base, remotely denticulate, hirtellous, above finally glabrate and somewhat lustrous; heads 5 mm. high, glomerate; phyllaries appressed-pubescent; fertile flowers usually 3; achenes 2 mm. long, glabrous; sterile flowers 3–5.

Clibadium glomeratum Greenm. Proc. Amer. Acad. 39: 98. 1903. Forests of Tuis ("Luis" in the original publication), 650 meters, *Tonduz 11508*. Also on the slopes of Barba, at 2,000 meters or less. Endemic. A shrub of 1.5–2.5 meters, the branches pilose with short, spreading hairs; leaves broadly ovate, 10–20 cm. long, 5–15 cm. wide, acute, obtuse to subcordate at the base, remotely serrulate, rough-pubescent above, densely hirtous beneath; branches of the panicle ferruginous-tomentose, the heads glomerate, sessile, about 2 mm. long; phyllaries 2, orbicular, ciliate at the apex; fertile flowers 4, the sterile 5; achenes 2 mm. long, villous at the apex.

Clibadium grande Blake, Contr. U. S. Nat. Herb. 22: 601. 1924. La Florida, Atlantic tierra caliente, 80 meters, *Pittier 11280*. Leaves long-petiolate, broadly ovate, about 30 cm. long and wide, acute, broadly rounded at the base, dentate-serrate, scabrid-strigillose above, strigillose beneath; panicles sordid-tomentulose, 9 cm. long, the heads sessile, not glomerate, 5.5 mm. long; phyllaries 3, strigillose; pistillate flowers 6, the perfect flowers 8–9; achenes 2 mm. long, pilose at the apex.

Clibadium grandifolium Blake, Contr. U. S. Nat. Herb. 22: 599. 1924. Río Pacuare, Llanuras de Santa Clara, 150 meters, *J. D. Smith 16068*. Atlantic tierra caliente. Endemic. Branches strigose; leaves long-petiolate, the blades broadly ovate or rounded-ovate, 15–28 cm. long, 12–23 cm. wide, short-pointed, truncate-rounded at the base and cuneately narrowed to the petiole, serrulate, scabrid above, strigillose beneath; panicles 17–24 cm. wide, the heads irregularly approximate, sessile, 5–6.5 mm. high; phyllaries 2–3, acute or acuminate, strigillose; fertile flowers 8–11, the sterile 9–10; achenes pilose at the apex.

Clibadium leiocarpum Steetz. *C. Pittieri* Greenm. Proc. Amer. Acad. 39: 98. 1903 (La Florida, Atlantic tierra caliente, 80 meters, *Pittier 11290*). *C. terebinthaceum* (Sw.) DC. var. *Pittieri*

O. E. Schulz, Bot. Jahrb. 46: 626. 1912. Atlantic tierra caliente, ascending to the central region, at least on the lower slopes of Poás. Panama. A shrub of 1.5–2.5 meters, the branches strigose; leaves ovate, 10–15 cm. long, 4–8 cm. wide, acuminate, narrowed to the base, dentate above the middle, hirsute-pubescent on both surfaces; heads 5 mm. high, the phyllaries narrowly ovate, acute, strigose; fertile flowers 7–9; achenes pubescent at the apex. *C. terebinthaceum*, to which Schulz referred this plant, is a species of Jamaica and Colombia. *C. leiocarpum* var. *strigosum* Blake, Journ. Wash. Acad. 27: 382. 1937 (Cerro de Piedra Blanca, above Escasú, Prov. San José, *Standley 32593*) is a form with strigose pubescence. The reduction of *C. Pittieri* to synonymy under *C. leiocarpum* is made at the suggestion of Dr. S. F. Blake.

Clibadium polygynum Blake. *C. Pittieri* f. *phrixium* Greenm. Proc. Amer. Acad. 40: 38. 1904 (Puerto Viejo, Río Sarapiquí, *Biolley 7399*). Forests and thickets of the tierra caliente; region of San Ramón; Guanacaste. Extending to Guatemala. Branches densely hispidulous with spreading hairs; leaves ovate or ovate-lanceolate, 7–9 cm. long, 2.5–4 cm. wide, acuminate, cuneate at the base, serrate, scabrous and hispidulous on both surfaces; panicles mostly small and dense, the heads short-pedicellate, 5 mm. high; phyllaries usually 2, subacute, strigose; fertile flowers about 29, the sterile about 8; achenes densely pilose at the apex.

Clibadium Schulzii Blake, Contr. U. S. Nat. Herb. 22: 602. 1924. Copey, 1,800 meters, *Tonduz 11915*. Frequent in thickets of the central region, and in Dota. Endemic. A shrub, or sometimes a tree of 7 meters, with a dense, rounded crown; branches densely pilose-tomentose with ascending hairs; leaves short-petiolate, lance-ovate, 6–9 cm. long, 2–3 cm. wide, acuminate, acutely cuneate at the base, serrulate, strigose above, densely pilose beneath with subappressed hairs; panicles 3–6 cm. wide, the heads on pedicels 2 mm. long or less, 3.5–4 mm. high; phyllaries 3, obtuse or subacute, glabrate; fertile flowers 5–6, the sterile 12–14; achenes sparsely pilose at the apex.

Clibadium surinamense L. Thickets of the Atlantic tierra caliente, ascending to the region of Cartago, at 1,200 meters or less; El General. Ranging to West Indies and the Guianas. A shrub of 1–2 meters, the branches strigose; leaves short-petiolate, oblong-ovate, acute or acuminate, rounded at the base and cuneate-attenuate to the petiole, serrulate, 5–17 cm. long, 2–8 cm. wide, very scabrous above, more softly pilose beneath; heads sessile, 5 mm. long; phyllaries 3–4, subacute, short-pilose; fertile flowers 3–6, the sterile 8–13; achenes glabrous, black.

Clibadium villosum Benth. Thickets of the Atlantic tierra caliente, ascending to the Meseta Central, at 1,200 meters or less. Colombia. Similar to *C. surinamense;* branches densely villous-tomentose; leaves scabrous above, villous-tomentose beneath; branches of the panicle densely tomentose; heads 4–4.5 mm. long; fertile flowers 3–4, the sterile 9–14.

CONYZA L.

Annual or perennial herbs, the leaves alternate, sometimes mostly basal, varying from entire to pinnatisect; heads small, usually numerous and paniculate or corymbose, disciform, the outer flowers pistillate and fertile, the inner ones perfect and all or mostly fertile; involucre campanulate, the phyllaries appressed, linear or lanceolate, the outer gradually shorter; receptacle plane or convex, not paleaceous; achenes compressed, truncate, sometimes costate; pappus of numerous slender, soft bristles.—A few other species probably occur in Central America.

Conyza chilensis Spreng. In pastures or thickets, Meseta Central and nearby mountain slopes; region of San Ramón. Widely distributed in tropical America. Stems erect, mostly about 40 cm. high or less, pilose, simple or sparsely branched; lower and basal leaved oblanceolate or linear-oblanceolate, coarsely crenate to lyrate-pinnatifid, the cauline leaves linear and entire, rough-pubescent; heads few, racemose or subcorymbose, long-pedunculate, the involucre about 1 cm. broad; achenes 1 mm. long, 1-nerved on each face; pappus brownish.

Conyza coronopifolia HBK. Pastures on the lower slopes of Irazú, perhaps introduced. Extending to Mexico. Plants probably perennial, the stems often several from the base, usually abundantly branched; cauline leaves sessile, most of them deeply pinnate-lobate, the lobes entire, broad, obtuse, hispidulous; heads whitish, about 8 mm. broad, rather closely clustered at the ends of the branches, the phyllaries linear, pilose; pappus more or less fulvous.

Conyza lyrata HBK. Thickets of the Pacific coast. Widely distributed in tropical America. A coarse annual, sometimes a meter high, villous-pilose and very viscid; cauline leaves obovate, dentate and lyrate-lobate; heads greenish white, 7 mm. high, in broad, leafy panicles; pappus white or nearly so. A common weed along the Pacific coast of Central America. The plant has a strong and offensive odor.

COREOPSIS L.

Glabrous or pubescent herbs; cauline leaves opposite, most of the leaves often basal, entire to dissected; heads of medium or rather large size, yellow, solitary at the ends of the stems or laxly corymbose-paniculate radiate; phyllaries commonly 2-seriate, more or less connate at the base, the outer ones generally herbaceous, the inner membranaceous; ray flowers commonly neutral, the disk flowers mostly fertile; disk paleaceous; achenes obcompressed, mostly oblong, often 2-winged; pappus none or of 2 awns or teeth.—One or more species are native in northern Central America.

Coreopsis lanceolata L. *Chispa, Margarita amarilla.* Sometimes planted for ornament in gardens of the temperate region. Native of the United States. An erect perennial, about 60 cm. high, glabrous or nearly so, slender; leaves mostly clustered at the base of the stems, long-petiolate, oblanceolate-linear; stems scapose, each bearing a single large, yellow head with long, spreading rays.

Coreopsis tinctoria Nutt. Cultivated at Zarcero, and said to reproduce itself abundantly. Native of southwestern United States. A slender, erect annual, usually much branched; leaves parted into numerous narrow segments, the stems leafy; heads large and showy, with bright yellow rays.

COSMOS Cav.

Annual or perennial herbs; leaves opposite, mostly pinnatifid; heads usually rather large, long-pedunculate, radiate, the disk flowers yellow; involucre biseriate; ray flowers neutral, the disk flowers perfect and fertile; receptacle flat, paleaceous; achenes narrow, somewhat angulate, distinctly rostrate; pappus of 2–4 retrorsely barbate or hispid awns.

Cosmos caudatus HBK. Occasional as a weed in waste ground of the tierra caliente; region of San Ramón; at 700 meters or less. Widely distributed in tropical America. Plants usually a meter high or less, branched, sparsely pilose or glabrate; leaves bipinnate, the divisions ovate to linear-lanceolate; involucre 12–15 mm. high, the outer phyllaries linear-lanceolate, ciliate; rays pink, 1–2 cm. long; achenes linear, 10–15 mm. long.

Cosmos sulphureus Cav. *Cambray.* Sometimes planted for ornament in gardens of the temperate region. Native of Mexico. Somewhat similar to the preceding species, but the rays orange-yellow.

CREPIS L.

Herbs, the leaves alternate or basal, mostly dentate or pinnatifid; sap milky; heads small or medium-sized, usually paniculate or corymbose; involucre cylindric to campanulate, the principal phyllaries 1-seriate and equal, some short ones present at the base of the involucre; receptacle generally flat, naked or short-fimbrillate; rays truncate and dentate at the apex; achenes linear-oblong, 10–20-costate, narrowed at the base and apex, not rostrate; pappus of slender, soft, white bristles.—No species are native in Central America.

Crepis capillaris (L.) Wallr. Naturalized in pastures, La Palma de San Ramón. Introduced from Europe. Plants annual, 60 cm. high or less, leafy, corymbosely branched above, glabrous, or somewhat hirsute below; basal leaves spatulate, pinnatifid or dentate; cauline leaves lanceolate or oblong, amplexicaul; heads 1–1.5 cm. wide, slender-pedunculate; involucre 6–8 mm. long, pubescent or glandular-pubescent, the phyllaries lanceolate; achenes 10-costate.

Crepis heterophylla Klatt, Leopoldina Bot. Beibl. 8. 1895. San Rafael de Cartago, 1,500 meters, *Pittier 6994.* Plants nearly glabrous, the stems erect, striate, leafy, bearing 1 or 2 heads, 25–65 cm. high; leaves 6 cm. long and 2.5 cm. wide, cordate-lanceolate, cordate-spatulate, or cordate, sinuate-dentate, mucronate-cuspidate, auriculate-amplexicaul, or petiolate; petioles broadly winged; peduncles glandular-hispid, bracteate at the base, the bracts lanceolate, pectinate-dentate; involucre campanulate, the phyllaries lanceolate, white-pilose, the inner ones 1 cm. long; achenes villous. I have summarized Klatt's description, but have seen no material of the plant he describes. In view of his many errors in referring Compositae to genera with which they had no close relationship, it is unwise to speculate upon the proper position of the present plant, whose description does not suggest to me any of the Cichorieae listed here for Costa Rica.

DAHLIA Cav.

Tall, coarse, perennial herbs, sometimes treelike and more or less ligneous, glabrous or pubescent; leaves opposite, variously pinnate-parted; heads large, long-pedunculate, radiate, the disk flowers yellow; ray flowers neutral, the disk flowers fertile; involucre biseriate, the outer phyllaries short, subfoliaceous, the inner membranaceous; receptacle plane, paleaceous; achenes glabrous, oblong or obovate, compressed, rounded at the apex; pappus none.—One or more additional species are native in northern Central America.

Dahlia rosea Cav. *Dalia, Catarina, Catalina. D. dumicola* Klatt, Bull. Soc. Bot. Belg. 35: 289. 1896 (in hedge, San Francisco de Guadalupe, *Pittier & Tonduz 8469*). Common in the central region, especially in hedges, often an abundant weed in cornfields; sometimes found in forest. Extending to Mexico. A tall, coarse herb or shrub, usually about 3 meters high, glabrous or nearly so, too well known to need special description here. In the Meseta Central the common dahlia behaves almost exactly like the sunflowers (*Helianthus annuus*) of the central and western United States. It takes possession of the cornfields when the corn is well grown, and often is quite as conspicuous as the corn itself. The wild plants have white or more often pink heads, which are either single or double-flowered. The wild plants with very large, white rays have been referred to *D. Maxonii* Safford, described from Guatemala, but I am inclined to believe that material so named, at least that from Costa Rica, is better referable to *D. rosea* (*D. variabilis* Desf.). Some of the better varieties of cultivated dahlias are, of course, to be found in Costa Rican gardens, and the common wild form likewise is common in village gardens. It is curious to observe that the country people give the name *dalia* to the garden plants, while the wild ones are called *Catarina* or *Catalina*. When asked what may be the differences between the plants receiving these two names, they always retort with some surprise that *dalias* are garden plants, while *Catarina* is a weed.

DELILIA Spreng.

Rather low and slender, annual herbs, branched; leaves opposite, petiolate, dentate; heads numerous, small, pedicellate, aggregate at the ends of the branches, radiate; involucre compressed, the 2–4 phyllaries membranaceous, the outer one large and broad, herbaceous, concealing the flowers; ray flowers 1–3, pistillate, fertile, the disk flowers 1–4, perfect, sterile; achenes obovate, compressed; pappus none.—A single species is found in North America. In general appearance it is quite unlike most Compositae, and suggestive rather of some groups of Acanthaceae.

Delilia biflora (L.) Kuntze. *Elvira biflora* Cass. Frequent in waste ground, thickets, or pastures, often in cultivated land, Meseta Central to the Pacific coast, and probably also in the Atlantic tierra caliente. Plants mostly 30–50 cm. high, much branched, the pubescence rather sparse or dense, of short, whitish, appressed or spreading hairs; leaves petiolate, mostly 3–5 cm. long, ovate to lanceolate, acute, 3-nerved, incised-crenate; outer phyllaries green, rounded-cordate, 4–6 mm. long, persistent; achenes glabrous, 2 mm. long.

DIMORPHOTHECA Moench

Annual or perennial herbs, glabrous or pubescent; leaves alternate or mostly basal, entire to incised, usually narrow; heads of medium or large size, long-pedunculate; disk flowers yellow to purplish, the rays of the same colors or white; heads radiate, the ray and outer disk flowers fertile; involucre broad, the phyllaries 1–2-seriate, subequal, linear, acuminate, scarious-margined; receptacle plane or subconvex, naked; achenes glabrous, those of the ray subtrigonous, rugose or muricate, those of the disk compressed, the margin sometimes winglike.—All the species are natives of southern Africa.

Dimorphotheca annua Less. Grown frequently for ornament in gardens of the temperate region, as elsewhere in Central America. Native of South Africa. A diffuse, simple or branched annual, gray-pubescent; leaves narrowly oblong or obovate-oblong, tapering to the base, with a few coarse, remote teeth; heads nodding, the flowers white and purple.

DIPLOSTEPHIUM HBK.

Reference: Blake, Key to the genus *Diplostephium*, with descriptions of new species, Contr. U. S. Nat. Herb. 24: 65. 1922.

Low shrubs, more or less tomentose or lanate; leaves alternate, usually entire and coriaceous; heads small, solitary at the ends of the branches or corymbose-paniculate, radiate, the rays white to purple; involucre campanulate, the phyllaries several-seriate, graduated, with thin margins, usually somewhat recurved in age; receptacle flat or subconvex; ray flowers fertile, the disk flowers perfect, fertile or sterile; achenes 3–5-costate, glabrous, glandular, or hispid; pappus copious, mostly biseriate, the outer of short bristles or squamellae, the inner longer, setose.—A single species is found in North America.

Diplostephium costaricense Blake, Contr. U. S. Nat. Herb. 24: 82. *pl. 27.* 1924. Cerro de La Muerte, 3,100 meters, *Pittier 10459.* Collected also on Cerro de Las Vueltas, and in forest at

La Palma de San José, 1,500 meters. Endemic. A dense shrub of 4.5 meters or less; leaves oblanceolate or linear-oblanceolate, 2.5–4 cm. long, subacute, narrowed to the sessile base, entire, grayish-tomentulose; heads 6–9 mm. high, in dense panicles, the rays white, the disk purple-red; achenes 1.5–2.5 mm. long, densely glandular. The Costa Rican plant has been referred to *D. Schultzii* Wedd., a Colombian species, and *D. rupestre* (HBK.) Wedd., of Colombia and Ecuador. The shrub is a characteristic one of the low, wet thickets at the upper limit of vegetation on the central volcanoes.

DYSSODIA Cav.

Herbs or low shrubs, usually with conspicuous oil glands; leaves opposite or alternate, entire to dissected; heads small or medium-sized, radiate or rarely discoid, yellow or orange; involucre usually campanulate, the principal phyllaries 1-seriate, narrow, equal, more or less connate, glandular-punctate, a few small ones often present at the base; achenes slender; pappus of 5–20 paleae, these often awned or aristate-dissected.—Two or three other species are found in northern Central America.

Dyssodia montana (Benth.) Gray. *Girasolillo. Clomenocoma montana* Benth. Frequent in thickets or pastures, Meseta Central, descending on the Pacific slope almost or quite to the coast; region of San Ramón; Guanacaste; ascending rarely to 1,800 meters. Panama to Guatemala. A rather strong-scented, erect, perennial herb, a meter high or less, almost glabrous; leaves opposite, practically simple, the lateral divisions reduced to subulate lobes or bristles on the petiole, the blades ovate or lanceolate, 3–5 cm. long, serrate or laciniate, mostly acuminate, minutely strigillose beneath; heads solitary on long, bracteate peduncles; involucre 1.5 cm. high; rays orange, about 1 cm. long; achenes sericeous-villous, 3 mm. long, the pappus of 10 dissected squamellae 7–8 mm. long. Costa Rican material of this species has been referred incorrectly to *D. grandiflora* DC.

ECLIPTA L.

Erect or prostrate, branched, annual herbs, pubescent; leaves opposite, small; heads small, pedunculate, terminal and axillary, radiate, whitish; involucre broadly campanulate, the phyllaries imbricate, about 2-seriate, subequal or the outer longer; receptacle plane or convex, paleaceous; ray flowers pistillate and fertile, the disk flowers perfect and mostly fertile; achenes trigonous or compressed; pappus none or of a few small teeth.—A single species is found in tropical America.

Eclipta alba (L.) Hassk. Frequent in waste or cultivated ground, usually in moist places, Meseta Central to the coasts. Generally distributed in tropics of both hemispheres, also in temperate regions. Plants usually prostrate or decumbent, the pubescence minute, appressed, rough; leaves lanceolate or linear-lanceolate, acute or acuminate, 2–10 cm. long, denticulate or entire, sessile, or the lower ones petiolate; heads 6–12 mm. broad, numerous but inconspicuous, subsessile or slender-pedunculate, the very short rays easily overlooked. This is one of the most common and widely distributed of all tropical weeds.

EGLETES Cass.

Low herbs, usually viscid and densely pubescent, branched; leaves alternate, dentate or lobate; heads small, pedunculate, radiate, terminal or opposite the leaves; involucre hemispheric, the phyllaries few-seriate, imbricate; receptacle ovoid or conic, naked; flowers perfect; achenes oblong, compressed, smooth; pappus reduced to a dentate or ciliate, cartilaginous ring.—A single species is known from Central America.

Egletes viscosa (L.) Less. Guanacaste (Bebedero), collected by Brenes. Rather widely distributed in Central America, but apparently of infrequent occurrence. Plants commonly 50 cm. high or less and densely dichotomous-branched, the abundant pubescence of short, spreading, viscid hairs; leaves small, broadly obovate, coarsely dentate or sublobate, toward the base often lyrate-lobate; heads about 5 mm. broad, yellow, the minute rays white.

ELEPHANTOPUS L.

Reference: Gleason, N. Amer. Fl. 33: 106. 1922.

Perennial herbs, the stems sometimes scapiform; leaves alternate, but often chiefly basal, entire or dentate; heads small, mostly in glomerules that are pedunculate and corymbose, subtended by 1–3 foliaceous bracts, 1–5-flowered; involucre of 2 decussate pairs of phyllaries; achenes truncate, usually 10-costate; pappus of 5–8 rigid scales, these prolonged into setae.—No other species are known from Central America.

Elephantopus hypomalacus Blake, Contr. Gray Herb. 52: 20. 1917. Orotina, 180 meters, *Holway 314*. Frequent in pastures or thickets of the tierra caliente; region of San Ramón; Guanacaste; at 900 meters or less. Extending to Mexico. Plants with leafy, branched stems, mostly 60 cm. high or less, pilose with chiefly long, spreading hairs; cauline leaves broadly obovate to oblong-obovate, 10–20 cm. long, acute, inconspicuously serrate, densely and softly pilose beneath; glomerules of heads numerous, 1 cm. long; involucre 8 mm. long; achenes 3.5 mm. long, pilose; pappus bristles 4–5 mm. long, gradually dilated below to a narrowly triangular base. Some of the Costa Rican material has been referred to *E. mollis* HBK., a species ranging from Mexico into South America, but all the specimens from Costa Rica which I have examined seem to be referable rather to *E. hypomalacus,* if this species is really distinct from *E. mollis,* which is rather doubtful.

Elephantopus scaber L. *Hierba de San Antonio, Lechuguilla, Escobilla, Achicoria.* Common in pastures and thickets of the central region, extending into the upper part of the tierra caliente; Aguacate; region of San Ramón. Believed to have been introduced from the East Indies; established also in Guatemala. Plants mostly 30–40 cm. high, simple or branched; leaves all or chiefly basal, oblong-obovate, 8–12 cm. long, obtuse, densely pilose beneath; achenes 2.5 mm. long. The plant has every appearance of being perfectly at home in central Costa Rica, and it is hard to believe that it is an introduced species. The flower heads are white, as in the preceding species. A decoction made from the leaves of the plant is one of the local remedies for dysentery.

ELEUTHERANTHERA Poit.

Low, more or less hirsute, perennial herbs; leaves thin, opposite, petiolate, dentate; heads small, usually discoid, terminal and axillary, the flowers all perfect, or a few neutral flowers with very small rays sometimes present; involucre broadly campanulate, the phyllaries few, unequal; receptacle convex, paleaceous; achenes thick, oblong-obovate, somewhat compressed, rounded at the apex; pappus cupular, ciliate-dentate or with 2–3 short awns.—The genus consists of a single species.

Eleutheranthera ruderalis (Swartz) Schultz Bip. Waste ground or thickets of the Atlantic tierra caliente (Changuinola Valley). Widely distributed in tropical America. Plants 60 cm. high or less, often much branched, sometimes diffusely spreading; leaves ovate to oblong-lanceolate, 6 cm. long or less, 3-nerved, acute, rounded or narrowed at the base; peduncles 2–12 mm. long; involucre 5–6 mm. high, the phyllaries oblong or ovate-oblong, obtuse; achenes 2–3 mm. long.

EMILIA Cass.

Reference: Garabedian, A revision of *Emilia,* Kew Bull. 137. 1924.

Somewhat succulent herbs; leaves alternate and basal, the cauline ones often amplexicaul; heads small, long-pedunculate, discoid, pink to purple, orange, red, or white, solitary or laxly corymbose; involucre cylindric or campanulate, the phyllaries linear, uniseriate, equal; receptacle plane, naked; achenes subterete or 5-angulate; pappus of numerous soft, white, capillary bristles.—The species are natives of the Old World.

Emilia sagittata (Vahl) DC. *E. coccinea* Sweet. Sometimes grown in gardens of the Meseta Central, and perhaps escaping from cultivation. Probably native of tropical Africa, but occasionally naturalized in tropical America. Plants slender, erect, sparsely villous; cauline leaves dentate or entire; heads dark red, the flowers conspicuously longer than the involucre.

Emilia sonchifolia (L.) DC. Naturalized in pastures or waste ground of the tierra caliente, but apparently infrequent. Native of the Old World tropics; widely naturalized in tropical America. A slender annual, glabrous or sparsely pubescent, pale, branched; cauline leaves repand-dentate to lyrate-pinnatifid; heads cylindric, the involucre 8–12 mm. long, the flowers pale purple or pink, scarcely exceeding the involucre.

ERECHTITES Raf.

Coarse, erect, simple or branched herbs; leaves alternate, coarsely dentate to deeply pinnatifid; heads rather small, disciform, whitish or purple, corymbose-paniculate; involucre cylindric, the principal phyllaries 1-seriate, linear, subequal, sometimes with a few very short ones at the base; receptacle concave, naked; flowers all fertile; achenes linear-oblong, angulate or striate; pappus capillary, of abundant, long, soft, capillary bristles.—No other species are known from Central America.

Erechtites hieracifolia (L.) Raf. *E. carduifolia* DC.(?). Frequent in waste or cultivated ground, sometimes in forest, Meseta Central and upper part of the Pacific tierra caliente; region of San Ramón; ascending rarely to 1,800 meters. Widely distributed in tropical and temperate America. Plants pale green, slightly succulent, usually a meter high or less, simple or sparsely branched, hirsute or glabrate; leaves mostly lanceolate or ovate-lanceolate, coarsely dentate and the lower ones sometimes incised, 5–20 cm.

long, the upper sessile and auriculate-clasping, the lower narrowed to slender petioles; heads 12–20 mm. long, whitish; pappus white. The Central American plants referred to this species are somewhat variable and may represent two or more species or varieties. The proper name to be used for the tropical plant is somewhat uncertain. Probably it is not true *E. hieracifolia*, which is properly a northern species.

Erechtites valerianaefolia (Wolf) DC. *Eupatorium angosturae* Polak. Linnaea 41: 575. 1877 (Angostura, *Polakowsky 479*). Frequent in thickets or forest, Meseta Central and especially on the nearby forested mountain slopes, chiefly at 1,200–2,450 meters; Guanacaste. Widely distributed in tropical America. Plants mostly 1–2 meters high, thinly villous or glabrate, simple or branched; leaves mostly pinnate-lobate, the lobes often numerous and narrow, incised; heads numerous, bright purple; pappus pink or purple. This species is much more showy than *E. hieracifolia*, but both are decidedly unattractive weeds.

ERIGERON L.

Annual or perennial herbs, simple or branched; leaves alternate, or sometimes chiefly basal, entire to pinnatifid; heads very small to medium-sized, paniculate or solitary, radiate (rays sometimes very small); involucre campanulate, the phyllaries linear, subequal, 1–3-seriate; receptacle almost plane, naked; rays white, pink, or purple, pistillate, the disk flowers yellow, perfect; achenes compressed, 1–2-nerved; pappus of numerous slender bristles in 1 or 2 series.—Other species are found in Central America.

Erigeron adenophorus Greenm. Proc. Amer. Acad. 39: 94. 1902. *Senecio eriocephalus* Klatt, Bull. Soc. Belg. 31: 212. 1892. Between Rancho del Jaboncillal and summit of Cerro de La Muerte, 3,100 meters, *Pittier 3425*. Known only from the original collection. Plants suffruticose, branched, the branches hirsute, glandular-pubescent; leaves sessile, amplexicaul, at first erect or spreading, later reflexed, linear-lanceolate, 1–2 cm. long, acute, sparsely dentate, densely glandular-pubescent and with long, flaccid hairs; heads forming dense cymes, about 1 cm. high, the outer phyllaries covered with long, matted hairs; achenes puberulent.

Erigeron bonariensis L. Frequent in thickets or waste ground of the Meseta Central, and doubtless at lower elevations; reported from El General. Widely distributed in tropical America. Plants rather slender, erect, often a meter high, branched or almost simple, hispidulous or glabrate; lower leaves lanceolate or oblanceolate, acute, sometimes 10 cm. long and 1.5 cm. wide, but usually much smaller, acute or acuminate, dentate or somewhat pinnate-lobate, the upper leaves lanceolate or linear, usually entire; heads in large but rather narrow panicles, very numerous, 5 mm. high; phyllaries acuminate, hispidulous; pappus fulvous or brownish. A common weed in many regions of Central America. This species has been reported from Costa Rica under the name *Conyza floribunda* HBK.

Erigeron irazuensis Greenm. Proc. Amer. Acad. 40: 36. 1904. La Playita, Volcán de Irazú, 3,300 meters, *Pittier 14075*. Endemic, and known only from the slopes of Irazú, growing usually on wet banks, at 1,800 meters or more. Plants somewhat ligneous at the base, the stems erect or ascending, 10–20 cm. long, pilose; leaves spatulate to oblanceolate, 1–3.5 cm. long, apiculate-acute, somewhat dentate, gradually narrowed to a marginate petiole, pilose-hirsute; heads few, 10–12 mm. high, terminating slender peduncles; involucre pubescent; rays pink or rose-red; achenes pubescent. The plant was reported from Costa Rica by Klatt as *E. nevadensis* Wedd.

Erigeron jamaicensis L. Collected at Las Cóncavas, south of Cartago, and in the region of San Ramón at 1,050 meters. Honduras to Panama; Greater Antilles. Plants very slender, the stems suberect or decumbent, simple or sparsely branched, pubescent; leaves mostly basal, spatulate, usually entire or subentire, sometimes deeply lobate, mostly 2 cm. long or less, those of the stems chiefly linear and bractlike, usually entire; heads few, 4–5 mm. high, the bracts narrowly scarious-marginate; rays white, small. This is presumably the plant listed by Klatt as *E. cuneifolius* DC.

Erigeron Karvinskianus DC. *E. mucronatus* DC. Frequent in forest or on brushy slopes about Escazú, at 1,800 meters, and in the region of Cartago. Panama to Mexico. Plants perennial, erect or ascending, branched, the stiff branches strigose or almost glabrous, densely leafy; leaves lanceolate to narrowly spatulate, mostly 2.5 cm. long or less, short-petiolate, acute, remotely lobate-dentate or entire, sparsely strigose or glabrate; heads few, long-pedunculate, the involucre scarcely 5 mm. long, the numerous slender rays white or pinkish.

Erigeron pusillus Nutt. Frequent in thickets or waste ground about the Meseta Central, and probably also in the tierra caliente;

often in cultivated places. Widely distributed in tropical and temperate America. Plants slender, usually a meter high or less, simple or branched, the stems glabrate; lower leaves spatulate, dentate or entire, the upper ones linear, entire, ciliate; heads very numerous, forming a narrow panicle, greenish white; involucre only 2–3 mm. high; rays very short and inconspicuous, often overlooked. The plant is closely similar to *E. canadensis* L., a common species of North America, with which it is commonly confused, but is nearly or quite glabrous, and the phyllaries have purplish tips.

Erigeron spathulatus Vahl. Common in waste ground or thickets, often in cultivated land, Meseta Central to the coasts; rarely ascending to 1,800 meters or more. Widely distributed in tropical America, and in the tropics of the Old World. Plants erect, rather stout, usually a meter high or less, often much branched, abundantly short-pilose; lower leaves spatulate to obovate, coarsely dentate, 10 cm. long or less, on marginate petioles, the upper leaves smaller, mostly obtuse, sometimes entire; heads whitish, in open, terminal corymbs, 4–5 mm. high.

Erigeron subspicatus Benth. in Oerst. Vid. Medd. Kjoebenhavn 82. 1853. Volcán de Irazú, 2,400 meters, *Oersted.* Slopes of Volcán de Irazú, and in the region of Dota, usually in pastures or on open banks, at 2,400–3,400 meters. A variety of the species has been described from Guatemala. Plants erect, simple, about 30 cm. high, scabrous-puberulent and pilose-lanate, whitish; leaves dilated at the base and more or less decurrent, linear-oblong or lanceolate, 2 cm. long or less, with a few coarse teeth; heads small, numerous, forming a dense spike along the upper part of the stem, the spike leafy-bracted; rays minute and inconspicuous, white.

EUPATORIUM L.

Shrubs or small trees, sometimes annual or perennial herbs; leaves mostly opposite, very variable in form; heads discoid, red to purple, blue, or white, with few to many flowers, usually arranged in corymbose or thyrsoid panicles; achenes columnar to obovoid, 5-costate or 5-angulate; pappus of numerous slender bristles.—A vast genus in tropical America, with many other species in Central America.

Eupatorium Allenii Standl., sp. nov.—Herba erecta metralis, caule subtereti vel obtuse hexangulari infra inflorescentiam glabro, internodiis superioribus elongatis foliis subaequalibus; folia modica opposita petiolata membranacea, petiolo usque 1 cm. longo crassiusculo sparse pilosulo vel fere omnino glabro; lamina anguste rhombico-ovata vel oblongo-lanceolata ca. 8 cm. longa atque 3 cm. lata, longe sensim attenuato-acuminata, basi cuneata, in toto margine subgrosse crenata, in sicco fusca, supra viridis tantum ad costam venasque minute puberula, subtus fere concolor, ad costam nervosque minute adpresso-pilosula vel fere glabra; inflorescentia ampla foliosa corymbosa ca. 15 cm. longa atque aequilata, ramis valde adscendentibus oppositis sparse sordido-puberulis, capitulis numerosis parvis in cymulas sat densas subglobosas aggregatis, pedicellis gracilibus plerumque 3–4 mm. longis, bracteis parvis linearibus; involucrum campanulatum ca. 4 mm. altum, phyllariis subbiseriatis linearibus, interioribus angustioribus apicem versus attenuatis subacutis glabratis, extimis paullo brevioribus sparse adpresso-pilosulis vel fere glabris; flores 20 vel paullo ultra albi; achaenia linearia nigra fere 2 mm. longa 4-angulata ad angulos hirtella; pappi setae numerosae albae 3.5 mm. longae.—In thickets, summit of Volcán de Poás, 2,575 meters, *P. H. Allen 597* (type in Herb. Field Mus.). The present plant has much the general appearance of *Archibaccharis asperifolia* (Benth.) Blake, with which I at first confused it. Although it has no particularly conspicuous distinguishing characters, I have been unable to place it with any of the species previously recorded for Costa Rica. There is available only the upper part of the stem, consequently it is probable that the lower leaves are substantially larger than those described above. Their venation is rather curious and distinctive: from the cuneate part of the blade, in the lower third of its length, there issue 3–4 pairs of very oblique lateral nerves, while just above them 2 pairs of similar nerves issue from a common point, making the venation there practically palmate; in the upper part of the blade only about 2 pairs of nerves issue from the costa.

Eupatorium amygdalinum Lam. Thickets and pastures of the Pacific tierra caliente; region of El General. Extending to Venezuela. Plants erect, stiff, herbaceous or suffrutescent, usually 60 cm. high or less, pubescent or almost glabrous; leaves sessile, lance-oblong or ovate-oblong, coriaceous, obtuse, narrowed to the base, crenate-serrate to entire, 5–10 cm. long, conspicuously venose; heads purple-pink, 7–8 mm. high, about 40-flowered, usually pedicellate and glomerate, forming open, terminal panicles; phyllaries linear, purple-tinged. The plant is a characteristic species of the savannas.

Eupatorium angulare Robinson, Contr. Gray Herb. 96: 19. 1931. *E. fistulosum* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 249. 1904, non Barratt, 1847. Forests of La Palma de San José, 1,550 meters, *Pittier 10167*. Frequent at the edge of forest, slopes of Irazú and Barba, especially in the region of La Palma; region of San Ramón; at 1,000–1,600 meters. Endemic. A stout shrub of 1.5–4 meters, sparsely branched, the stems fistulose, tomentulose when young; leaves long-petiolate, very large, suborbicular, often 20 cm. long or larger, cordate at the base, 3–12-lobate, dentate, palmately 3–9-nerved, pubescent above, tomentose beneath; heads rose-purple, 1 cm. long, 4–5-flowered, very numerous, pedicellate, forming a very large and broad, dense panicle; phyllaries very unequal, several-seriate, obtuse, ciliate; achenes glabrous, the pappus stramineous. A showy and handsome plant, abundant in some places on the middle or upper slopes of the central volcanoes, often forming dense thickets. In appearance it is most unlike all other Costa Rican species.

Eupatorium anisochromum Klatt, Bull. Soc. Bot. Belg. 31: 186. 1892. *E. adspersum* Klatt, Leopoldina Bot. Beibl. 1. 1895; Bull. Soc. Bot. Belg. 35: 279. 1895 (bridge of Cariblanco, road to Sarapiquí, *Biolley 7422*). *E. polanthum* Klatt, Leopoldina Bot. Beibl. 3. 1895; Bull. Soc. Bot. Belg. 35: 281. 1895 (Cuesta de Tarrazú, 1,900 meters, *Tonduz 7797*). Laguna de Barba, 2,755 meters, *Pittier 1940*. Frequent in thickets or meadows on the upper slopes of the central mountains, chiefly at 1,500–3,400 meters, but also in the region of San Ramón, at about 1,200 meters. Endemic. An herb or shrub, sometimes 2 meters high, but usually much lower, often much branched, the stems terete, villosulous or glabrate; leaves thick, short-petiolate, oblong-lanceolate to ovate-lanceolate, mostly 4–10 cm. long, acute to acuminate, cuneate or obtuse at the base, serrate, green above, pale beneath, more or less villosulous, conspicuously punctate; heads white or lavender, 5 mm. high, pedicellate, 12-flowered, forming small, very dense, rounded, corymbose panicles; phyllaries biseriate, villosulous, the outer acute, purplish at the apex, the inner obtuse; achenes 1 mm. long, glabrous, the pappus white.

Eupatorium araliaefolium Less. Tapantí; region of San Ramón; mountains of Guanacaste; at 1,300 meters or less. Extending to Mexico. An epiphytic shrub, glabrous except in the inflorescence, there more or less sordid-puberulent; stems terete or somewhat 6-angulate; leaves oblong-elliptic to rhombic-lanceolate, acute or acuminate, acute or cuneate at the base, short-petiolate, entire, penninerved, somewhat fleshy, drying fuscous, 11–19 cm. long. heads in small or large panicles, about 25-flowered, pedicellate, 1 cm; long or less; phyllaries long and narrow, subequal, caducous, the outer much shorter and persistent.

Eupatorium arthrodes Robinson, Contr. Gray Herb. 68: 8. 1923. In pasture, La Palma de San José, 1,550 meters, *Tonduz 12430*. Apparently frequent in the region of San Ramón, about 1,300 meters. Endemic. An epiphytic, branched shrub, 1–4 meters long, glabrous except in the somewhat puberulent inflorescence; petioles mostly 2–3.5 cm. long; blades oblong to elliptic-oblong or elliptic-ovate, usually 7–10 cm. long, acuminate, acute to almost rounded at the base, fleshy, drying fuscous, entire or remotely and obscurely dentate, penninerved; heads white or pink, pedicellate, in large or small, terminal corymbs, about 12-flowered, 1 cm. long or less; phyllaries about 10, ciliolate, otherwise glabrous, very unequal, broad, rounded at the apex, the outer ones broadly ovate, the inner oblong; achenes scaberulous on the angles, the pappus whitish.

Eupatorium Aschenbornianum Schauer. Frequent in forest and meadows of the central mountains, chiefly at 900–2,800 meters; regions of Dota and San Ramón. Panama to Mexico. An herb or shrub, sometimes 1.5 meters high but usually lower, branched, densely or sparsely villosulous with purplish or brownish hairs, the stems terete; leaves rounded-ovate or ovate, mostly 3–8 cm. long, subacute to acuminate, rounded or cordate at the base, finely crenate, slender-petiolate; heads white, 20–40-flowered, 5 mm. long, campanulate; phyllaries linear, subscarious, lacerate-ciliate toward the apex; pappus dirty white.

Eupatorium badium Klatt, Bull. Soc. Bot. Belg. 31: 186. 1892. *E. chlorophyllum* Klatt, op. cit. 187 (between La División and Alto del Palmital, valley of Río General, 1,100–2,160 meters, *Pittier 3429*). Along the road from Cerro de La Muerte to La División, 2,160–2,900 meters, *Pittier 3407*. Known in Costa Rica, apparently, only from the type region. Perhaps also in southern Mexico. Plants frutescent, the branches terete, pilosulous; leaves long-petiolate, rhombic, acuminate, cuneate at the base, 5-nerved, cartilaginous-serrate, about 8 cm. long and 4 cm. wide, pilosulous on both surfaces; petioles 1–1.5 cm. long; panicles axillary and terminal, the branches bearing 2–3 heads, the pedicels 2–6 mm. long; heads about 20-flowered, the phyllaries biseriate, lanceolate, 3 mm. long, cuspidate, ciliate and pubescent; achenes pilose on the angles, the pappus white.

Eupatorium Brenesii Standl., sp. nov.—Frutex epiphyticus vel interdum terrestris atque scandens, vulgo 1.5–2.5 m. longus, ramis crassis in sicco subteretibus striatis glabris vel in statu juvenili tomentulosis, internodiis elongatis; folia majuscula longipetiolata subcarnosa, petiolo gracili 4–7 cm. longo fere glabro; lamina ovata vel oblongo-ovata plerumque 13–22 cm. longa atque 7–9 cm. lata acuminata, basi acuta vel subrotundata penninervia, grosse arcteque dentata vel remote denticulata vel serrata, in sicco fusca, supra glabra, subtus sparse vel subdense praesertim ad venas sordido-villosula; inflorescentia laxissima grandis multicapitata, vulgo 20–30 cm. longa atque aequilata, nuda, ramis sordide puberulis vel villosulis, pedicellis gracilibus plerumque 3–5 mm. longis, capitulis laxe cymose dispositis; capitula 5–9-flora ca. 7 mm. alta, corollis lilacinis; phyllaria biseriata valde inaequalia, exteriora oblonga obtusa ciliolata dorso sparse puberula, interiora glabrata lineari-oblonga apicem obtusum versus paullo attenuata; achaenia angusta glabra fere 3 mm. longa, pappi setis stramineis.—Alto de La Palma de San Ramón, 1,260 meters, February, 1923, *Brenes 3842* (type in Herb. Field Mus.), *3834*. Viento Fresco, Prov. Alajuela, 1,600–1,900 meters, *Standley 47955*. Yerba Buena, northeast of San Isidro, Prov. Heredia, 2,000 meters, *Standley & Valerio 50067*.—PANAMA: Bajo Chorro, Prov. Chiriquí, 1,800 meters, *Mrs. M. E. Davidson 318*. Considering the number of species of *Eupatorium* described from Costa Rica, it is somewhat remarkable that no name has been found for this plant, represented by several collections from separated localities. It is closely related to *E. araliaefolium*, which differs conspicuously in the form of its entire leaves, which usually are quite glabrous. The specimens referred to *E. Brenesii* exhibit a good deal of variation in dentation of the leaves, but all probably are conspecific.

Eupatorium carnosum Kuntze, Rev. Gen. 1: 337. 1891. Type collected by Kuntze on the Atlantic slope at 700 meters. Known definitely only from the original collection. A glabrous shrub of 2–3 meters, presumably epiphytic, the branches terete; leaves broadly lanceolate, fleshy, penninerved, entire or subentire, 6–8 cm. long, the petioles about 1 cm. long; heads in terminal corymbs, 1 cm. long; phyllaries caducous, about 4-seriate, the inner ones oblong, the outermost suborbicular, obtuse, multistriate, whitish; flowers 20–25, pink; pappus stramineous. I have seen no material that seemed referable to this species, which apparently is too closely related to *E. araliaefolium*, differing chiefly in its smaller leaves.

Eupatorium collinum DC. Common in hedges or thickets, Meseta Central; regions of Dota and San Ramón; chiefly at 1,000–1,400 meters. Extending to Mexico. A shrub of 1–4.5 meters, the slender branches terete; leaves long-petiolate, deltoid-ovate, acuminate, cuneate to rounded or subcordate at the base, crenate to serrate or sometimes almost entire, obscurely puberulent to spreading-pubescent, 5–10 cm. long, glandular-punctate beneath; heads 24–46-flowered, 8 mm. high, white, fastigiate-grouped into small, dense, round-topped corymbs, usually slender-pedicellate; phyllaries lanceolate to oblong, mostly obtuse. Called Vara blanca in Salvador. Costa Rican material of this species was listed in error by Klatt under the name *E. plectranthifolium* Benth.

Eupatorium costaricense Kuntze, Rev. Gen. 1: 337. 1891. Angostura, 1,600 meters, *Kuntze*. Ecuador. A scandent shrub, the upper branches scabrous by the bases of deciduous hairs; leaves short-petiolate, ovate, acuminate, rounded at the base, 5–8 cm. long, scaberulous, especially beneath, remotely dentate, triplinerved; inflorescences axillary, corymbose; heads 10–20-flowered, campanulate, 8–10 mm. long; phyllaries pilose, few-striate, about 3-seriate, the inner ones subacute, linear, the outer ovate; achenes glabrous, the pappus stramineous. Known to the writer only from description. Kuntze states that it is similar to *Gynoxis* in habit, and related to the Mexican *E. albicaule* Schultz Bip.

Eupatorium daleoides (DC.) Hemsl. In thickets and forest, Meseta Central and nearby mountains; regions of Dota and San Ramón; chiefly at 1,000–1,500 meters, but ascending to probably 2,000 meters. Panama to Mexico. A shrub or tree of 2.5–6 meters, somewhat fulvous-villosulous, at least on the young parts, the branches terete; leaves short-petiolate, thin, oblong to lance-oblong or ovate-oblong, 10–20 cm. long, acute or acuminate, cuneate at the base, serrate, pinnate-nerved, pellucid-punctate; heads white or greenish white, 5-flowered, sessile, forming large, rounded or ovoid panicles; phyllaries stramineous, ovate to narrowly oblong, obtuse, the involucre 5–6 mm. high.

Eupatorium Durandii Klatt, Bull. Soc. Bot. Belg. 31: 189. 1892. Between Potrero del Alto and the crater of Volcán Poás, 2,000 meters, *Pittier 387*. In wet thickets, upper slopes of Poás and apparently also of Turrialba, at 2,000–3,000 meters. Endemic. A densely branched shrub, 1.5 meters high or less, the branches slender, villosulous, rather densely leafy; leaves small, ovate or lance-ovate, mostly 1–3 cm. long, obtuse or acute, cuneate or obtuse at the base, nearly sessile, 3-plinerved, almost glabrous above, pale beneath, almost or quite glabrous, conspicuously punctate; heads dull white, 4 mm. long, pedicellate, 10-flowered, forming small, compact, corymbose panicles; phyllaries biseriate, oblong-ovate, purplish, erose-dentate, villosulous; achenes puberulent on the angles, the pappus dirty white. Closely related to *E. anisochromum*, and it is not altogether clear to the writer that the species are really distinct.

Eupatorium elatum Steetz. Thickets and forest of the tierra caliente; region of San Ramón. Panama. Plants slender, herbaceous, much branched, 1–2 meters high, sparsely puberulent or short-villosulous throughout, the stems terete, striate; leaves thin, pinnate-nerved, sessile, lanceolate or oblanceolate, the larger as much as 25 cm. long, acuminate, entire or undulate, attenuate to the narrow base, the very base somewhat dilated and amplexicaul; heads greenish white, 5 mm. high, 20–25-flowered, short-pedicellate, in small clusters at the ends of the branches of a large, very open panicle; phyllaries 2–3-seriate, obtuse, sparsely villosulous; achenes sparsely hirtellous on the angles, the pappus dirty white.

Eupatorium eximium Robinson, Contr. Gray Herb. 73: 11. 1924. Near La Palma de San José, on the road to La Hondura, 1,500–1,700 meters, *Maxon & Harvey 7941*. Frequent on the mountain slopes near La Palma; slopes of Barba; mountains south of Cartago; 1,500–2,000 meters. Endemic. An epiphytic shrub, often forming dense clumps, about 1 meter long, glabrous except in the somewhat puberulent inflorescence, the branches terete; leaves short-petiolate, oblong, about 5–6 cm. long, acuminate, acute at the base, fleshy, entire or slightly undulate, penninerved; panicles large or small, terminal, corymbiform; heads slender-pedicellate, about 9-flowered, 8–9 mm. high, pale purple; phyllaries about 10, unequal, 3-seriate, the outer ones lanceolate, subacute, the inner oblong, ciliolate, rounded at the apex, 4 mm. long; achenes glabrous, the pappus yellowish white. A showy and handsome plant, like other related species of epiphytic habit.

Eupatorium glandulosum HBK. is reported, doubtless in error, by Klatt from several localities. The proper reference of the material so reported is unknown to the present writer. *E. glandulosum* is a synonym of *E. adenophorum* Spreng., a species unknown at present from Costa Rica.

Eupatorium hebebotryum (DC.) Hemsl. Occasional in forest of the central region, at about 1,300 meters. Ranging to Mexico. A large shrub or small tree, the slender branches slightly angulate, puberulent; leaves rhombic-lanceolate to elliptic-oblong, 10–20 cm. long, acuminate or long-acuminate, acute at the base, crenate-serrate, penninerved, conspicuously pellucid-punctate and lineolate, short-petiolate; inflorescence dense, large, terminal, rounded or thyrsiform, the branches tomentellous; heads about 5-flowered, white, 8 mm. long, short-pedicellate; phyllaries very unequal, pale green or stramineous, the inner oblong, obtuse or rounded at the apex, glabrous or nearly so; pappus yellowish white. Easy of recognition because of the closely pellucid-punctate leaves.

Eupatorium hygrohylaeum Robinson, Contr. Gray Herb. 77: 19. 1926. Wet forest, La Hondura, Prov. San José, 1,200–1,500 meters, *Standley & Valerio 51933*. Known only from the original material. An erect, perennial herb, the stems terete, obscurely tomentulose; leaves petiolate, ovate, about 8 cm. long and 5 cm. wide, acuminate, rounded at the base, serrate, pinnate-nerved, glabrous above, somewhat puberulent beneath on the nerves and veins; heads in large, terminal corymbs, pedicellate, about 30-flowered, 7 mm. high; phyllaries about 4-seriate, rounded at the apex, white-striate, puberulent, lacerate-ciliolate, the outer ones ovate, the inner ovate-oblong; corollas white; achenes sparsely hirtellous on the angles, the pappus white.

Eupatorium hylonomum Robinson, Proc. Bost. Soc. Nat. Hist. 31: 250. 1904. In forest, Las Vueltas, Tucurrique, 650–700 meters, *Tonduz 12882*. Region of San Ramón, at about 1,000 meters. Endemic. A shrub or tree of 3–5 meters, the branches slender, subterete, puberulent or minutely tomentulose; leaves short-petiolate, oblong or oblong-lanceolate, 10–18 cm. long, narrowly long-acuminate, acute or attenuate at the base, undulate-serrulate or almost entire, glabrous or nearly so; panicles large, pyramidal, sordid-tomentulose; heads 4 mm. long, about 7-flowered, very numerous, arranged in subglobose glomerules; phyllaries about 9, very unequal, the outer ones short, ovate, subacute, puberulent, the inner broadly oblong, subacute, glabrous, 2 mm. long; achenes puberulent, yellowish white. This species is too close to *E. Pittieri*, and its claim to specific status is decidedly dubious.

Eupatorium hymenophyllum Klatt, Bull. Soc. Bot. Belg. 31: 190. 1892. Río San Pedro, between El General and Buenos Aires, *Pittier 3709.* Forests of the mountains south of Cartago, extending to the upper part of the Atlantic tierra caliente; region of Dota; Guanacaste; at 1,600 meters or less. Endemic. Plants herbaceous or suffrutescent, about a meter high, branched, the branches terete, striate, pilose; leaves thin, petiolate, rhombic-lanceolate, about 10 cm. long and 3 cm. wide, acuminate, cuneate at the base and attenuate to the petiole, incised-serrate, 7-nerved, glabrous; branches of the panicle hirsute; heads long-pedicellate, 20–25-flowered, the flowers yellowish white to purple; phyllaries glabrous, 3-seriate, lanceolate, acute, stramineous, scarious-margined, 2 mm. long; achenes scabrous on the angles, the pappus whitish.

Eupatorium ixiocladon Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 77. 1853. *Chirrite blanco.* Southern slope of Volcán de Irazú, 2,700 meters, *Oersted 9597* (photo. of type in Herb. Field Mus.). Perhaps also in the region of San Ramón. Endemic. Plants herbaceous or suffrutescent, almost glabrous, the branches terete, glutinous; leaves long-petiolate, ovate or deltoid-ovate, 7–13 cm. long, 5–7 cm. wide, long-acuminate, truncate to rounded-cuneate at the base, rather coarsely crenate; heads numerous, white, 4–5 mm. long, forming small, terminal, corymbose panicles, the branches minutely puberulent; heads about 20-flowered, the phyllaries linear, subbiseriate, scarcely striate, the inner ones acuminate; achenes scabrous on the angles, the pappus dirty white.

Eupatorium laevigatum Lam. Savannas of the Pacific tierra caliente; thickets at Pejivalle; at 900 meters or less. Mexico to Argentina. A shrub of 1–2 meters, very viscid but otherwise glabrous or nearly so, the branches angulate; leaves short-petiolate, rather thick, rhombic-ovate to ovate-oblong, acute, cuneate at the base, 3-nerved from the base, coarsely serrate; heads about 12 mm. long, sessile or pedicellate, pale lavender, numerous, forming very dense, convex corymbs; involucre cylindric, the phyllaries indurate, pale, closely appressed, obtuse or rounded at the apex, striate.

Eupatorium laurifolium Robinson, Proc. Bost. Soc. Nat. Hist. 31: 251. 1904. Hills near Río Chirripó, *Pittier 16065.* Known, apparently, only from the original material. A scandent shrub, the branches slender, striate, glabrate; leaves oval, about 12 cm. long and 5 cm. wide, caudate-acuminate, acute at the base, 5-nerved, undulate-dentate or entire, glabrous, obscurely pellucid-punctate, the petioles 1.5 cm. long; panicles pedunculate, sordid-pubescent; phyllaries about 4-seriate, oval-oblong, striate, concave, ciliate but otherwise glabrous; corollas 5 mm. long; achenes pubescent, the pappus sordid yellowish.

Eupatorium ligustrinum DC. *E. semialatum* Benth. Frequent in forest and thickets of the Meseta Central, sometimes forming almost pure stands, extending to the upper part of the Pacific tierra caliente; regions of Dota and San Ramón. Ranging to Mexico. A shrub or tree of 1–6 meters; leaves oblong, 4–9 cm. long, acuminate, cuneate at the base, petiolate, pinnate-nerved, remotely serrate-dentate, glabrous, glandular-dotted beneath; heads 4–8-flowered, 7 mm. long, white or pinkish, fragrant, forming small, dense, terminal corymbs; phyllaries linear, gland-dotted, half as long as the flowers; pappus often deep pink.

Eupatorium macrophyllum L. Frequent in thickets or weedy fields of the tierra caliente; region of San Ramón; Guanacaste. Widely distributed in tropical America. Plants herbaceous, simple or branched, 1–2 meters high, pale-tomentulose, especially on the lower leaf surface, the stems terete; leaves thin, large, long-petiolate, broadly ovate, acuminate, broadly cordate at the base, crenate; heads greenish white, 50–75-flowered, 7 mm. high; phyllaries graduated, many-seriate, lanceolate, acute, pale-nerved; pappus dirty white. A common, weedy plant in many regions of the Central American tierra caliente.

Eupatorium microstemon Cass. *E. guadalupense* Spreng. In thickets or forest, Meseta Central; region of Dota; Guanacaste. Mexico to West Indies and Bolivia. A slender, weak, usually branched annual, a meter high or commonly lower, puberulent; leaves slender-petiolate, deltoid-ovate, 2.5–7 cm. long, thin, narrowed to an acute or obtuse apex, subtruncate at the base, crenate-serrate; heads 4–5 mm. high, purple or white, slender-pedicellate, forming a lax panicle; phyllaries 3–4-seriate, 3-nerved, the outer ones lanceolate, acute, the inner linear-oblong, rounded at the apex. Var. *lilacinum* Kuntze (Rev. Gen. 1: 338. 1891; described from Trinidad and Costa Rica) is a form with purple or lilac corollas, those of the typical form of the species being white.

Eupatorium morifolium Mill. *E. populifolium* HBK. In thickets or hedges, region of San José to the coasts; region of San Ramón; at 1,100 meters or less. Mexico to Brazil. Plants herbaceous or suffrutescent, simple or sparsely branched, 1.5–3 meters high, the stout stems subterete, glabrous or nearly so; leaves large, broadly ovate to ovate-oblong, 12–20 cm. long or larger, acute or short-acuminate, acute to cordate at the base, coarsely serrate, rather thick, triplinerved or pinnate-nerved; heads greenish white, 8–12-flowered, sessile or short-pedicellate, about 7 mm. high, forming large, thyrsoid panicles; phyllaries stramineous, ovate, obtuse or rounded at the apex, arachnoid-tomentose or glabrate, about 5-seriate; pappus fulvous whitish. Material of this species was reported from Costa Rica by Klatt under the name *E. hebebotryum* Benth.

Eupatorium Neaeanum DC. is reported by Klatt from San Pedro de La Calabaza, presumably in error. The species is known from Mexico and Guatemala.

Eupatorium nemorosum Klatt. In fields or thickets, sometimes in wet soil, regions of San Ramón and of La Palma de San José, 1,000–1,400 meters. Extending to Bolivia. Plants annual or perennial, herbaceous, stout, erect, 1.5 meters high or less, the stem usually simple, terete, villosulous and glandular-pilose; leaves oblong, 7–15 cm. long, acuminate, serrate, attenuate into a broadly winged petiole, pinnate-nerved, rough-pilose on both surfaces; heads numerous, greenish white, many-flowered, 1 cm. high, forming a narrow panicle, pedicellate; involucre campanulate, about 3-seriate, the phyllaries lanceolate, acute; achenes glabrous or nearly so, the abundant pappus dirty white. In general appearance this plant is quite unlike other local species. In habit and form of the heads it reminds one somewhat of *Erechtites hieraciifolia.*

Eupatorium odoratum L. *E. conyzoides* Mill. Common in thickets, Meseta Central to the coasts; region of San Ramón; Guanacaste. Generally distributed in tropical America. A shrub of 1–2 meters or more, often subscandent, the branches commonly recurved or pendent, the stems terete, villous; leaves petiolate, deltoid-ovate or rhombic-ovate, 7–10 cm. long, long-acuminate, abruptly narrowed and acute at the base, subentire to coarsely dentate, often subhastate, sparsely villous above, pubescent or velutinous beneath; heads lavender, about 1 cm. long, cylindric, 20–35-flowered, in small, dense, trichotomous, convex corymbs; phyllaries several-seriate, rounded at the apex, closely appressed, indurate, striate. Probably the most common *Eupatorium* species of tropical America, often a weed in abandoned or cut-over land. Rather showy when covered with its abundant flower clusters. *E. odoratum* var. *mallotophyllum* Robinson, originally described from Colombia, is reported by Blake (in litt.) to be represented in Costa Rica, according to material at the Gray Herbarium. It is distinguished by having the leaves densely griseous-tomentose on both surfaces.

Eupatorium Oerstedianum Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 74. 1853. Cerro de Aguacate, 600 meters, *Oersted 9616* (photo. of type in Herb. Field Mus.); also Cartago and Cerros de Candelaria. Thickets and forest of the Meseta Central, and upper part of the Pacific tierra caliente; region of San Ramón; Guanacaste. Ranging to Guatemala and British Honduras. A stiff shrub, 1–2.5 meters high, the branches terete, glabrate; leaves sessile or short-petiolate, oblong or lance-oblong, mostly 15–20 cm. long, acuminate, acute or obtuse at the base, serrate, pinnate-nerved, glabrous above, puberulent beneath on the veins; heads cylindric, about 40-flowered, white, 1 cm. long; phyllaries indurate, closely appressed, stramineous, obtuse or rounded at the apex, ciliate; achenes puberulent.

Eupatorium pacacanum Klatt, Leopoldina Bot. Beibl. 3. 1895. *E. roseum* Klatt, Bull. Soc. Bot. Belg. 31: 194. 1892 (Rodeo de Pacaca, *Pittier 3324*). Both names were based upon the same collection. Known, apparently, only from the original material. An almost glabrous shrub, the branches terete; leaves long-petiolate, ovate, 3–5 cm. long, 3 cm. wide, acute, rounded at the base, membranaceous, crenate, 3-nerved, ferruginous-pilose beneath along the nerves; heads in dense corymbs, 40-flowered, pedicellate, the pedicels pilose; phyllaries biseriate, spatulate, 3 mm. long, pink at the apex, 2-striate, scarious-margined; achenes hirtellous on the angles, the pappus white.

Eupatorium parasiticum Klatt, Ann. Naturhist. Hofmus. Wien 9: 357. 1894. Type *Endres 147* from Costa Rica, without definite locality. Apparently common in the region of San Ramón; also at La Hondura de San José; 1,000–1,300 meters. Endemic. A small, epiphytic shrub, less than a meter long, often only 20 cm. high, glabrous except for the inconspicuously puberulent inflorescence; leaves small, short-petiolate, oblong or oblong-elliptic, about 4 cm. long, obtuse or subacute, acute at the base, fleshy, coriaceous when dried, remotely and coarsely dentate or subentire; panicles small and lax, corymbiform; heads slender-pedicellate, pale purple, 5-flowered; phyllaries about 6, lanceolate, 5 mm. long, ciliolate, puberulent near the apex; achenes minutely pilose on the angles, the pappus white.

Eupatorium pithecobium Robinson, Contr. Gray Herb. 77: 28. 1926. Wet forest, Laguna de La Chonta, northeast of Santa María de Dota, Prov. San José, 2,000 meters, *Standley 42181*. Known only from the region of Dota, 2,000–2,400 meters. Endemic. An epiphytic shrub, pendent, 1.5 meters long or less, the branches obscurely puberulent; leaves petiolate, oblong or oblong-lanceolate, 5–12 cm. long, acuminate, cuneate at the base, closely serrate-dentate, penninerved, hirtellous beneath, especially on the costa; petioles 1–1.5 cm. long; corymbs terminal, of about 10 heads; heads about 22-flowered, 11 mm. long; involucre campanulate, the phyllaries 3–4-seriate, the outermost lanceolate, acute, the inner ones oblong or spatulate, obtuse, pink; corollas pink; achenes scaberulous on the angles, the pappus white.

Eupatorium Pittieri Klatt, Bull. Soc. Bot. Belg. 31: 192. 1892. *Quitirrí chico.* Along Río Segundo, *Pittier 1698.* Frequent in forest of the central mountains, ascending to about 2,000 meters; upper part of the Atlantic tierra caliente, and mountains of Guanacaste, at 600 meters or more. Panama to southern Mexico. A shrub or tree, 3–6 meters high, the slender branches minutely puberulent or almost glabrous; leaves short-petiolate, elliptic-oblong to oblong-lanceolate, 9–20 cm. long, narrowly long-acuminate, attenuate to the base, coarsely serrate to subentire, almost glabrous; heads very numerous, 5–6 mm. long, whitish, pedicellate, forming large panicles, about 10-flowered, campanulate; phyllaries 3-seriate, ovate, obtuse, very unequal, the inner 3 mm. long, striate, ciliate; achenes hirtellous on the angles, the pappus dirty white.

Eupatorium platyphyllum Robinson. Region of San Ramón; lower slopes of Poás; El General; at 1,400 meters or less. Mexico and Guatemala. A branched shrub of 3–4 meters, the branches terete or nearly so, at first tomentulose-puberulent, becoming glabrate; leaves slender-petiolate, broadly ovate or rounded-ovate, sometimes shallowly hastate-lobate, acute or acuminate, rounded or very broadly cuneate at the base, thin, 3-nerved from the base, undulate or dentate, almost glabrous; heads numerous, large, 60–75-flowered, 1 cm. high or larger, broad, slender-pedicellate, forming a large, corymbiform panicle; phyllaries pluriseriate, laxly imbricate, scarious, very unequal in length, stramineous, scarious and erose at the rounded apex, glabrous, many-nerved; corollas white; achenes glabrous, 2 mm. long, the pappus white.

Eupatorium plectranthifolium Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 76. 1853. Naranjo, 1,200 meters, *Oersted.* Birrís, on the lower slopes of Irazú; region of Dota; slopes of Barba, 1,600 meters. Endemic. A branched herb about a meter high, the branches terete, tomentulose or glabrate; leaves long-petiolate, ovate, acuminate, cordate or subcordate at the base, 8–11 cm. long, crenate-serrulate, thin, 7-nerved, glabrate above, tomentulose beneath on the reticulate veins; heads rose-purple, 4–5 mm. long, 30–40-flowered, short-pedicellate, forming dense, leafy, corymbose panicles; phyllaries ovate-lanceolate or lance-linear, acute, very unequal, the outer ones short, tomentulose, the inner 3–5-striate, tomentulose at the apex; achenes glabrous.

Eupatorium prionophyllum Robinson, Proc. Bost. Soc. Nat. Hist. 36: 484. 1901. Banks of Río Toros, *Pittier 1705*. Collected also at Rancho Flores, 2,030 meters, and at La Ventolera, slopes of Poás. Panama. A shrub or small tree, appearing glabrous but with traces of a short, close tomentum on the branchlets, petioles, leaf veins, and pedicels; leaves slender-petiolate, broadly ovate, acuminate, usually obtuse at the base, incisely serrate-dentate, thin, pinnate-nerved, 7.5–9 cm. long; heads 25–30-flowered, in terminal, rounded or thyrsoid panicles; phyllaries 3-seriate, the outer short, ovate, acute, the inner oblong, subobtuse, striate, ciliolate, stramineous; pappus white. The plant was listed incorrectly by Klatt as *E. ixiocladon* Benth. A variety has been described from Guatemala. The flowers of the La Ventolera plant were pale purple.

Eupatorium psoraleum Robinson, Proc. Bost. Soc. Nat. Hist. 31: 253. 1904. La Palma de San José, 1,460 meters, *Tonduz 12589*. Apparently known only from the original material. A shrub, apparently epiphytic, the branchlets slightly 6-angulate, striate, covered with minute, transverse scales; leaves petiolate, broadly lanceolate, 4–9 cm. long, acuminate at each end, entire, pinnate-nerved, glabrous; heads 5-flowered, short-pedicellate, forming a spreading panicle; phyllaries scarious, stramineous or pink, ciliolate, otherwise glabrous, very unequal, 3–4-seriate, the inner ovate-oblong, obtuse, slightly ampliate at the apex; corollas 4–5 mm. long, pink; achenes glabrous, 2 mm. long, the pappus sordid. According to the author of the species, it bears much resemblance to *E. daleoides*.

Eupatorium pycnocephalum Less. *Chirrite, Santa Lucía. E. pratense* Klatt, Bull. Soc. Bot. Belg. 31: 193. 1892 (pastures at Turrialba, 200 meters, *Pittier 4128*). Frequent in thickets or forest of the Meseta Central, descending into at least the upper part of the tierra caliente, ascending the slopes of the mountains to about 2,300 meters; regions of Dota and San Ramón. Mexico to Venezuela. A herbaceous perennial, 1.5 meters high or usually much lower, finely incurved-pubescent; leaves slender-petiolate, deltoid-ovate, 4–6 cm. long, acuminate, cuneate to truncate or shallowly cordate at the base, crenate-serrate, 3-nerved from the base, at least sparsely pilose on both surfaces; inflorescence with spreading or ascending branches, each bearing a rounded, terminal cluster of 7–20 or more short-pedicellate heads, these purple, about 25-flowered, 3–5 mm. high; involucre campanulate, the phyllaries about 3-seriate, the inner oblong, obtuse, 3-nerved, the outer ones acute, pubescent or almost glabrous; achenes somewhat pubescent.

Eupatorium quadrangulare DC. is cited by Klatt from the Pacific tierra caliente. This is probably an error of determination, since Robinson gives the range of the species as extending from Mexico only as far southward as Salvador.

Eupatorium Schultzii Schnittspahn. Occasional in forest and clearings of the central mountains; region of San Ramón; usually at 1,000–1,200 meters. Extending to southern Mexico. A branched shrub or coarse herb about a meter high, the slender branches terete, viscid-pilosulous; leaves large, thin, rounded-ovate, acuminate, rather deeply cordate at the base, often as broad as long as broader, undulate or coarsely dentate, somewhat puberulent, beneath densely and conspicuously glandular-punctate; heads white, campanulate, about 7 mm. high, many-flowered, slender-pedicellate, forming a large, broad panicle, the pedicels densely glandular-puberulent; phyllaries scarious, whitish, oblong or elliptic-oblong, rounded at the apex, glabrous; pappus white.

Eupatorium sexangulare (Klatt) Robinson, Proc. Amer. Acad. 43: 35. 1907. *Piptocarpha sexangularis* Klatt, Leopoldina Bot. Beibl. 1. 1895. "Descente de la Ardilla," 900 meters, *Tonduz 7760*. Also in the region of San Ramón, at about 1,100 meters. Endemic. A glabrous shrub of 1.5–2 meters, the stems sharply 6-angulate and sulcate, the internodes elongate; leaves large, short-petiolate, ovate-lanceolate, 10–26 cm. long or larger, acute or acuminate, acute and long-decurrent at the base, thick, very lustrous, sinuate-dentate or almost entire, penninnerved; heads white, 5-flowered, 7–8 mm. long, cylindric, forming large, terminal, open, corymbose panicles, the individual heads sessile or nearly so and densely glomerate; phyllaries multiseriate, stramineous, the inner caducous, ovate-lanceolate, striate, obtuse, the outer ones short, broadly ovate; achenes glabrous, 3 mm. long, the pappus yellowish white.

Eupatorium Sideritidis Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 77. 1853. Ujarrás, *Oersted 9656* (photo. of type in Herb.

Field Mus.). Frequent about the Meseta Central, descending to the tierra caliente, ascending to about 1,500 meters; region of San Ramón. Extending to Guatemala. Plants herbaceous, perennial, 30–60 cm. high, often forming dense clumps, very slender, rather sparsely puberulent; leaves narrowly lanceolate or almost linear, small, remotely serrate, 3-nerved, attenuate to the short petiole, glabrate; heads 4 mm. high, bright purple, 20–25-flowered, pedicellate, forming small, lax, terminal clusters; phyllaries 2–3-seriate-linear-lanceolate, acuminate, striate; pappus white or dirty white. Easily recognized among Costa Rican species by the very narrow leaves. The plant is highly specialized as to habitat, growing practically always at the edge of streams, on rocks or in mud.

Eupatorium silvicola Robinson, Proc. Bost. Soc. Nat. Hist. 31: 254. 1904. Forests of Copey, 1,800 meters, *Tonduz 11694*. Known, apparently, only from the original locality. Endemic. Plants fruticose, the branches sordid-tomentose; leaves large, ovate, 12–17 cm. long, 8–12 cm. wide, acuminate, obtuse at the base, serrate or subentire, thin, almost glabrous except beneath on the sordid-tomentose veins; petioles 3–7 cm. long; heads 7–10-flowered, pedicellate, 7 mm. long, arranged in a leafy panicle; phyllaries about 3-seriate, very unequal, the outer ones short, ovate, subacute, viscid-tomentose, the inner lance-linear, acute, subscarious, green-striate, glabrous or glabrate; achenes sparsely glandular.

Eupatorium Sinclairii Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 79. 1853. Cartago, *Oersted*. Thickets and fields, Meseta Central to the tierra caliente; region of San Ramón; Guanacaste. Panama to Guatemala, and probably ranging even more widely. Closely related to *E. microstemon*, and like that species in general appearance and in most details; heads smaller, only 3 mm. high, usually purple, forming large and lax panicles.

Eupatorium solidaginoides HBK. *E. decussatum* Klatt, Bull. Soc. Bot. Belg. 35: 295. 1896 (Río Virilla, near San Juan, *Tonduz 9869*). Thickets, regions of San José, San Ramón, and El General. Widely distributed in tropical America. Plants erect, slender, much branched, tall, herbaceous or suffrutescent, sometimes subscandent; leaves slender-petiolate, ovate, 5–12 cm. long, caudate-acuminate, truncate to cordate at the base and more or less hastate, dentate, thin, puberulent to subtomentulose beneath on the nerves; heads 10–15-flowered, slender-pedicellate, subracemose on the spreading branches of a large, leafy-bracted panicle, 5–6 mm. long, white; phyllaries lanceolate, acute, laxly imbricate, usually purple-tinged.

Eupatorium Standleyi Robinson, Contr. Gray Herb. 77: 40. 1926. Brushy slope, Alto de La Estrella, Prov. Cartago, *Standley 39288*. Also at La Hondura de San José, wet forest, 1,300–1,700 meters. Endemic. Plants herbaceous, erect or sometimes 3 meters long and scandent, glabrous or nearly so except in the inflorescence; leaves petiolate, ovate-oblong, 12–16 cm. long, subacute or obtuse, penninerved, coarsely dentate, somewhat fleshy; panicles large, puberulent, the heads 8 mm. high, 6-flowered, pedicellate; phyllaries about 8, very unequal, acute or subobtuse, ciliolate, the outer ones ovate; corollas pink; achenes glabrous, 2.5 mm. long, the pappus yellowish.

Eupatorium subcordatum Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 77. 1853. *E. splendens* Klotzsch ex Polak. Linnaea 41: 575. 1877 (Angostura, *Polakowsky*). Southern slope of Volcán de Irazú, 2,400 meters, *Oersted 9663* (photo. of type in Herb. Field Mus.). Slopes of Irazú and Turrialba, ascending to 3,400 meters. Endemic. Herbaceous or frutescent, sometimes 1.5 meters high, the branches minutely brown-puberulent or almost glabrous; leaves long-petiolate, ovate or broadly deltoid-ovate, 3.5–6 cm. long, acuminate, truncate or cordate at the base, crenate, rufous-pubescent beneath on the nerves and veins; heads 4–5 mm. long, pinkish white or pale lavender, about 20-flowered, forming dense, leafy corymbs, pedicellate; phyllaries linear, subbiseriate, puberulent, very unequal; achenes scabrous on the angles, the pappus dirty white. Material of this species (*Pittier 3432*) was referred by Klatt to *E. Dombeyanum* DC., a South American species.

Eupatorium Thieleanum Klatt, Bull. Soc. Bot. Belg. 31: 191. 1892. *E. myrianthum* Klatt, Leopoldina Bot. Beibl. 3. 1895 (based on the same material as *E. Thieleanum*). Rodeo de Pacaca, 900 meters, *Pittier 1603*. Mountains of the central region, descending to the Pacific tierra caliente; El General; region of San Ramón; at 1,800 meters or less, in forest. Panama. Plants branched, herbaceous or suffrutescent, 1–3 meters high, the stems slender, terete, sordid-tomentulose; leaves apparently all alternate, slender-petiolate, broadly ovate or rounded-ovate, often as broad as long, acuminate, rounded to deeply cordate at the base, crenate-dentate, often somewhat trilobate or hastate-lobate, thin, scaberulous or glabrate above, short-villosulous or tomentulose beneath on the nerves and veins; panicles small, dense, terminal and axillary, the heads glomerate, sessile or short-pedicellate, 4 mm. long, white, about 25-flowered; phyllaries biseriate, lanceolate, obtuse or subacute, minutely villosulous; receptacle pilose; achenes 1 mm. long, glabrous or nearly so, the pappus white.

Eupatorium Tonduzii Klatt, Leopoldina Bot. Beibl. 4. 1895; Bull. Soc. Bot. Belg. 35: 282. 1896. Cuesta de Tarrazú, 1,900 meters, *Tonduz 7799*. Oak forest, region of Dota, 1,500–2,100 meters. Endemic. A shrub of 1–2 meters, puberulent; leaves petiolate, lanceolate, 10–14 cm. long, acuminate at each end, crenate or crenate-serrate, penninerved, obscurely puberulent on the costa, elsewhere glabrous; heads numerous, in terminal corymbs, pinkish white, pedicellate, about 28-flowered, 7 mm. high; phyllaries about 16, linear-lanceolate, attenuate, often purple-tinged at the apex, 4 mm. long; achenes 2 mm. long, scaberulous on the angles, the pappus white. The species is related to *E. ligustrinum* DC.

Eupatorium triptychum Robinson, Contr. Gray Herb. 77: 43. 1926. Wet forest, El Muñeco, south of Navarro, Prov. Cartago, 1,400 meters, *Standley 33458*. Known only from the original locality. A large shrub, almost glabrous except in the inflorescence; leaves trifoliolate, long-petiolate; leaflets petiolulate, oblong, 6–10 cm. long, acuminate, rounded to subacute at the base, obsoletely crenate-undulate; heads 12-flowered, 9 mm. high, slender-pedicellate, numerous, forming large, terminal corymbs; phyllaries linear-oblong, 4–4.5 mm. long, rounded at the apex, ciliolate, glabrate; achenes puberulent on the costae, the pappus dirty white. Easy of recognition because of its compound, 3-foliolate leaves.

Eupatorium Valerianum Standl., sp. nov.—Herbacea vel frutescens ut videtur elata, ramis gracilibus teretibus brunnescentibus minute adpresse sordido-tomentulosis vel glabratis, internodiis vulgo elongatis; folia opposita graciliter longipetiolata membranacea, petiolo 1.5–3.5 cm. longo sordido-puberulo vel glabrato; lamina ovata usque lanceolata 6.5–11.5 cm. longa 2.5–7 cm. lata longe attenuato-acuminata, basi rotundata vel breviter abrupte decurrens, in toto margine grosse crenato-dentata, 5-plinervia, nervis superioribus alte supra basin laminae nascentibus, supra viridis, ad nervos villosulo-puberula, subtus fere concolor, ad nervos venasque dense tomentulosa, aliter glabrata; inflorescentia terminalis irregulariter corymboso-paniculata foliosa, capitulis numerosissimis parvis breviter pedicellatis ut videtur albis, inflorescentia densa, capitulis cymose dispositis; capitula ca. 4 mm. alta campanulata ca. 10-flora; phyllaria ca. 10 subbiseriata, valde inaequalia, exteriora brevia oblongo-lanceolata acuminata minute puberula, interiora 2.5 mm. longa spathulatooblonga scariosa viridescentia 2-costata apice subdilatato late rotundata vel subtruncata glabrata; corolla glabra ca. 2.5 mm. longa; achaenia ca. 1.5 mm. longa ad angulos minute scaberula, pappi setis albis 2 mm. longis scaberulis.—Colinas de San Pedro de San Ramón, March, 1935, *Brenes 20498* (type in Herb. Field Mus.). Cataratas de San Ramón, February, 1931, *Brenes 13428, 13455.* Similar to *E. prionophyllum* Robinson, but conspicuously different in the crenate-dentate rather than sharply serrate leaves, and in the tiny heads, which are about the smallest found in any local species of the genus. The species is named in honor of Professor Juvenal Valerio Rodríguez, Director of the Museo Nacional de Costa Rica.

Eupatorium Vitalbae DC. Occasional in forest or thickets of the central region, extending to the tierra caliente of both coasts; at 1,500 meters or less. Central America to Peru and Brazil. A shrub of 1–2.5 meters, sometimes scandent, the stems and inflorescence finely puberulent; leaves petiolate, coriaceous, elliptic-ovate or ovate-lanceolate, acuminate, rounded at the base, 3–5-nerved, remotely serrate; heads bright pink, 12 mm. high, 45–70-flowered, on long, stout pedicels, forming large, open panicles; outer phyllaries ovate-oblong, acute, multistriate, the inner narrowly lance-oblong; achenes minutely hispid on the angles. A handsome plant because of the bright-colored flower heads.

Eupatorium vulcanicum Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 78. 1853. *Chirrite blanco.* Southern slope of Volcán de Irazú, 2,700 meters, *Oersted* (photo. of type in Herb. Field Mus.). Occasional in thickets and forest of the central mountains, chiefly at 1,400–2,700 meters. Endemic. Plants herbaceous or suffrutescent, about a meter high, the branches rufous-villous; leaves petiolate, rounded-ovate, obtuse or acute, subcordate at the base, crenate, 3–5-nerved, pubescent above, rufous-villous beneath; heads numerous, in dense, terminal corymbs, about 20-flowered, white; phyllaries subbiseriate, linear-lanceolate, acuminate, the outer ones densely pubescent; achenes hispidulous on the angles.

FLEISCHMANNIA Schultz Bip.

Plants herbaceous or suffrutescent; leaves opposite or alternate, dentate to biternately parted; heads small, discoid, white or purplish, long-pedunculate, solitary or subcorymbose; phyllaries many-seriate, graduated, dry, acuminate, striate; receptacle naked; achenes linear, 5-angulate; pappus of 5–8 bristles, with minute, setulose squamellae between them, or the squamellae united into a low crown, or obsolete.—Probably no other species are known in Central America.

Fleischmannia arguta (HBK.) Robinson. *F. rhodostyla* Schultz Bip. *Eupatorium quinquesetum* Benth. Reported by Klatt from Quebrada de Tapshi, near Boruca, *Pittier 7344*. Nicaragua to southern Mexico. An herb of 20–40 cm., in general appearance suggestive of *Erigeron*, puberulent, slender, branched; lower leaves opposite, the upper alternate, petiolate, rhombic to lanceolate, 4 cm. long or less, acute or acuminate, cuneate at the base, coarsely dentate, 3-nerved; heads few, about 8 mm. broad, the phyllaries 2–3-seriate, 4 mm. long, puberulent; achenes obscurely scaberulous on the angles, the pappus of 5 bristles.

GALEANA Llave

Reference: Rydberg, N. Amer. Fl. 34: 42. 1914.

Slender, dichotomously branched annuals, more or less viscid-pubescent, the leaves glandular-punctate, petiolate, mostly opposite; heads small, radiate, in leafy cymes; phyllaries 5, broad, concave, oval; ray flowers 3, pistillate and fertile, the disk flowers partly fertile and partly neutral; achenes pyriform, triquetrous, some of the angles somewhat corky-thickened, some with corky, incurved, crenate wings.—No other species are known from Central America.

Galeana pratensis (HBK.) Rydb. *Villanova pratensis* Benth. & Hook. Occasional in pastures or thickets of the Meseta Central and the upper part of the Pacific slope. Ranging to southern Mexico. Plants much branched, bushy, usually 20–30 cm. high, glandular-pubescent; leaves deltoid-ovate to oblong, 2–3 cm. long, acute or obtuse, truncate or acute at the base, coarsely serrate, 3-nerved; involucres 3 mm. high, the bracts glandular-pubescent; rays whitish, scarcely 3 mm. long; achenes black, glabrate, 3 mm. long.

GALINSOGA Ruiz & Pavón

Reference: St. John & White, The genus *Galinsoga* in North America, Rhodora 22: 97. 1920.

Branched, annual herbs, pubescent; leaves opposite, usually petiolate, dentate; flower heads very small, radiate, white, pink, or purple, inserted in the upper leaf axils; involucre hemispheric, the phyllaries broad, few, biseriate, striate, subequal, the outer slightly shorter; receptacle conic, paleaceous; ray flowers pistillate, fertile, the rays 4–5, short; disk flowers yellow, perfect; achenes angulate or the outer ones compressed; pappus of the disk flowers of several short, laciniate or fimbriate scales, that of the ray flowers of few short, slender bristles, or none.—Probably no other species are to be found in Central America.

Galinsoga bicolorata St. John & White. Open banks, regions of San José and Cartago. Ranging to Mexico. Plants 20–30 cm. high, the stems hispid or glabrate; leaves ovate-cordate or lanceolate, 1.5–4 cm. long, acuminate, serrate, hispid; heads 3–4 mm. high, the outer phyllaries sparsely glandular-pilose; rays purple or pink; ray achenes hispid, the pappus scales linear, long-aristate, longer than the corolla tube; disk pappus of linear, fimbriate, long-aristate scales equaling or exceeding the corolla tube. All the species of this genus are alike in general appearance, the specific differences being found in the color of the rays and in the pubescence and pappus of the achenes.

Galinsoga caracasana (DC.) Schultz Bip. Frequent in meadows of the central region, especially on the mountain slopes, ascending to perhaps 3,000 meters. Widely distributed in tropical America. Rays pink or dark red; pappus of the disk flowers of linear-lanceolate, fimbriate scales half as long as the corolla, the corolla longer than the achene.

Galinsoga ciliata (Raf.) Blake. *G. aristulata* Bicknell. Occasional in fields of the central region; Dota. Widely distributed in tropical America. Rays white; pappus of the disk flowers aristate, fimbriate; pappus of the ray flowers of linear, minutely fimbriate scales equaling the tube of the corolla.

Galinsoga parviflora Cav. Frequent in fields and waste ground of the central region, often in cultivated land, descending to the upper part of the tierra caliente. Widely distributed in tropical America. Rays white; pappus of the disk flowers not aristate; pappus of the ray flowers none or of a few bristles. This species, like some of the others listed, although essentially a tropical plant, was introduced long ago into the eastern and northern United States, where it is perfectly hardy and thrives, especially in vacant ground about cities. It is particularly plentiful in Chicago in the courts of apartment buildings.

GARCILASSA Poepp. & Endl.

A slender annual, branched, erect or ascending, scabrous or hispid; leaves alternate, 3-nerved, serrate; heads small, discoid, aggregate at the tips of the branches into globose glomerules, 4–5-flowered; involucre very short, the phyllaries few; receptacle paleaceous;

achenes oblong, laterally compressed, short-pilose, sometimes narrowly winged; pappus very short, annular, ciliate-fimbrillate.—The genus consists of a single species.

Garcilassa rivularis Poepp. & Endl. In forest or thickets of the Atlantic tierra caliente; Guanacaste; at 700 meters or less. Ranging to Peru. Leaves petiolate, ovate or lanceolate, the pubescence rough; heads small, green, about 5 mm. long. An inconspicuous and rather weedy plant, apparently of rare occurrence in the regions where it is found.

GERBERA L.

Scapose, perennial herbs; leaves basal, entire or sinuate-pinnatifid, tomentose beneath; heads solitary at the end of the scape, erect, of medium or large size, radiate, yellow, reddish, or white; involucre turbinate or broadly campanulate, the phyllaries narrow, imbricate in few or numerous series, the outer gradually shorter; receptacle plane, naked; achenes somewhat compressed, 5-costate, villous, often rostrate; pappus of numerous slender setae.—The species are natives of Africa and Asia.

Gerbera Jamesoni Bolus ex Hook. f. Sometimes planted for ornament in gardens of the temperate region. Native of South Africa. Leaves greatly elongate, more or less pinnatifid, narrow, lanate or glabrate beneath; heads large, the narrow rays orange or flame-colored.

GNAPHALIUM L.

Annual or perennial herbs, sometimes suffrutescent, the pubescence whitish, lanate; leaves alternate, entire, often decurrent; heads small, disciform and glomerate, corymbose, spicate, or racemose; phyllaries scarious; receptacle plane to conic, naked; pistillate flowers in several series, their corollas filiform; central flowers few, perfect, tubular; achenes oblong or obovate, terete or slightly compressed, ecostate; pappus a single series of capillary bristles, coherent at the base or separately deciduous.—A few other species are known from Central America. The specific limits in this group are poorly understood, and the genus is seriously in need of careful revision. Some of the names used below are of doubtful application to the Costa Rican plants.

Gnaphalium attenuatum DC. *Ajenjillo cimarrón.* Common in pastures and thickets of the Meseta Central, and on the slopes of the neighboring mountains; region of Dota; chiefly at 1,100–2,400 meters. Panama to Mexico, and probably extending into South

America. Plants annual or probably persisting for more than one year, erect, branched, mostly 50–90 cm. high, the stems densely white-lanate; leaves linear or lance-linear, often 7 mm. wide, long-attenuate at each end, sessile or nearly so, not decurrent, densely lanate beneath, usually green and glabrate above; heads white, aggregate in small, rounded clusters, or the clusters sometimes rather lax and open, usually disposed in broad panicles. It is by no means certain that the Costa Rican material is the same as the Mexican plant that typifies this species, but *G. attenuatum* is the conventional name used by most botanists in naming any *Gnaphalium* from Mexico or Central America without any outstanding characters to force its reference to some different species.

Gnaphalium indicum L. I have seen one specimen of this species from San José, at 1,160 meters, *M. Valerio 204;* it is probable that other collections that have been determined as *G. purpureum* L. may be referable here. Native probably of the Old World tropics, but naturalized in the West Indies, and in South America. A slender annual, the stems 30 cm. long or less, very weak and decumbent; leaves spatulate to narrowly obovate, 1–4 cm. long, obtuse, densely lanate on both surfaces, narrowed to a somewhat amplexicaul base, thin; heads small, yellowish, forming dense, leafy spikes; involucre 2 mm. long.

Gnaphalium lavandulaefolium (HBK.) Blake. *Chionolaena lavandulaceum* Benth. & Hook. ex Hemsl.; *G. lavandulaceum* DC. Thickets of the upper slopes of Volcán de Irazú, and Cerro de La Muerte, 3,000–3,300 meters. Also in Mexico. Plants densely tomentose, suffrutescent, much branched, about 30 cm. high, the branches densely leafy; leaves ascending, or the older ones reflexed, about 8 mm. long; heads densely clustered at the tips of the branches, the phyllaries white at the tip, dark brown at the base.

Gnaphalium rhodarum Blake, Journ. Wash. Acad. Sci. 17: 61. 1927. In paramo, Cerro de Las Vueltas, Prov. San José, 2,700–3,000 meters, *Standley & Valerio 43623*. Also on Cerro de La Muerte. Endemic. Plants annual, single-stemmed, about 30 cm. high, erect, branched only above; leaves almost uniform, 2.5–5 cm. long, lanceolate, acuminate, broadest near the base and decurrent, green and glandular above, arachnoid-tomentose beneath; heads pink, in dense clusters crowded in a small panicle; involucre 4 mm. high.

Gnaphalium roseum HBK. *G. roseum* var. *hololeucum* Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 105. 1853 (summit of Volcán de Irazú, 3,300 meters, *Oersted* (duplicate of type, *Oersted 10577*, in Herb. Field Mus.); *G. roseum* var. *angustifolium* Benth. loc. cit. (near Cartago, 1,500 meters, *Oersted*); *G. roseum* var. *sordescens* Benth. loc. cit. (near Cartago, *Oersted 10576;* duplicate of the type in Herb. Field Mus.). *G. roseum* var. *stramineum* Kuntze, Rev. Gen. 1: 340. 1891 (type from Costa Rica, *Kuntze*). Frequent in meadows or thickets on the slopes of Irazú and Poás, 2,500–3,400 meters, and probably elsewhere. Ranging to Mexico. Plants perennial, with 1 or several stems from the base, often branched above, densely white-lanate almost throughout; leaves lance-linear, acute or acuminate, somewhat dilated, amplexicaul, and slightly decurrent at the base, rarely glabrate on the upper surface; heads small, pink to white or yellowish, densely glomerate, the clusters grouped in small, rounded, headlike panicles. The plants referred here are especially variable in color of the bracts, but all seem to represent a single species, which, however, may not really be *G. roseum* of Mexico. Material placed by Klatt under *G. Sprengelii* Hook. & Arn. may be referable here. Most Costa Rican collections named *G. oxyphyllum* DC. likewise may represent this same species.

Gnaphalium spicatum Lam. *G. purpureum* var. *macrophyllum* Greenm. Proc. Amer. Acad. 39: 97. 1903 (Copey, 1,800 meters, *Tonduz 11771*). Frequent in meadows or other grassy places, Meseta Central, ascending the slopes of the mountains to 2,500 meters or more; region of San Ramón, 1,000 meters; Dota. Widely distributed in tropical America. Plants probably annual, perhaps sometimes perennial, simple or often branched from the base, erect or ascending, rather stout, commonly about 30 cm. high; leaves spatulate or linear-spatulate, 2–6 cm. long, obtuse or rounded at the apex, green and glabrate above, white-lanate beneath, narrowed to the sessile base; heads small, usually rather dark brown, forming a dense, leafy, terminal spike, the phyllaries glabrous.

Gnaphalium subsericeum Blake, Journ. Wash. Acad. Sci. 17: 61. 1927. Wet meadow, La Palma, Prov. San José, 1,600 meters, *Standley 32941*. Collected also at Cartago, and apparently frequent in the region of San Ramón, descending to 1,000 meters. Endemic. Plants annual or perennial, about 30 cm. high, the stems mostly solitary, branched above; leaves linear, very narrow, 4–6 cm. long, green above, densely white-sericeous or lanate beneath, narrowed to each end, not decurrent, the margins revolute; heads 4 mm. high, white, densely glomerate, the clusters few, forming a small panicle; phyllaries sparsely arachnoid-tomentose below. The Costa Rican species is compared by its author with *G. salicifolium* (Bertol.) Schultz Bip., of Guatemala and Mexico, to which it is perhaps too closely related for convenient separation.

GYNURA Cass.

Herbs, the leaves alternate, entire to pinnate-lobate or dissected; heads medium-sized, discoid, solitary or corymbose at the ends of the branches, yellow or purplish, the flowers all perfect; involucre cylindric or campanulate, the phyllaries narrow, equal, 1-seriate, smaller ones sometimes present at the base of the involucre; receptacle plane, naked or short-fimbrillate; achenes 5–10-striate, glabrous; pappus of numerous many-seriate, soft, white bristles.—The species are natives of the Old World.

Gynura aurantiaca DC. *Túnica del Nazareno, Tornasol.* Planted for ornament in gardens of the Meseta Central. Native of Java. Plants a meter high or less, stout, branched, densely covered with violet or purple hairs; leaves ovate, large and soft, irregularly dentate, the upper ones amplexicaul; heads yellow or orange, 1.5 cm. high, forming a lax, terminal corymb.

HELENIUM L.

Reference: Rydberg, N. Amer. Fl. 34: 120. 1915.

Annual or perennial herbs; leaves alternate, impressed-punctate, usually decurrent and forming wings on the stems; heads medium-sized, solitary or corymbose, radiate; involucre at first rotate, the phyllaries narrow, 2–3-seriate, subequal; receptacle convex to conic, naked; ray flowers yellow, pistillate and fertile, the disk flowers perfect and fertile, yellow, brown, or purple; achenes obpyramidal, 4–5-angulate, with the same number of intermediate costae; pappus of 4–8 scarious squamellae.—A few other species are known from Central America.

Helenium centrale Rydb. Near Cartago, 1,270 meters, collected only by Cooper; perhaps introduced here. Ranging to Guatemala. A puberulent annual, probably 60 cm. high or more, the stems rather broadly winged; lowest leaves oblanceolate, 5–10 cm. long, entire or denticulate, the cauline leaves linear-lanceolate, attenuate; heads corymbose, long-pedunculate; phyllaries 4 mm. long; rays 4 mm. long; disk brown, globose, 1 cm. broad; achenes 1.5 mm. long, hispid on the angles. The Costa Rican collection was referred by Klatt to *H. mexicanum* HBK.

HELIANTHUS L. Sunflower

Coarse, annual or perennial herbs; leaves opposite or alternate, simple; heads large, radiate, usually long-pedunculate, corymbose or solitary, the rays yellow, the disk yellow, brown, or purple; involucre hemispheric or depressed, the phyllaries imbricate in several series; receptacle flat to conic, paleaceous; ray flowers neutral, the disk flowers perfect, fertile; achenes thick, oblong or obovate, compressed or slightly 4-angulate; pappus of 2 scales or awns, deciduous.—Probably no species are native in Central America.

Helianthus annuus L. *Girasol.* Cultivated occasionally for ornament. Native of the western United States. A well known plant, often becoming a pernicious and extremely abundant weed in many parts of the United States. Cultivated plants usually have much larger heads than wild ones, the disk of the head in some forms becoming almost 30 cm. broad. The seeds are edible, and in Russia, for example, the plant is much grown as a source of human food and of oil. The seeds are used commonly as food for parrots and other cage birds.

HELICHRYSUM Gaertn.

Herbs or shrubs, usually tomentose or lanate; leaves alternate, entire; heads large or small, said to have sometimes as many as 1,000 flowers, solitary or corymbose, disciform; involucre scarious, usually white or brightly colored in yellow or red, imbricate in numerous series, erect or spreading; achenes small, 5-angulate or terete; pappus of numerous slender bristles.—All the species are natives of the Old World.

Helichrysum bracteatum (Vent.) Andr. *Oropel. Straw-flower.* A stout, branched annual, a meter high or less, the stems glabrous or nearly so; leaves oblong-lanceolate, short-petiolate, green; heads 2.5–5 cm. broad, yellow or orange, the phyllaries short, obtuse. There are numerous color varieties with white or red heads. The dried flower heads are very ornamental, and may be preserved for a long time in bouquets. They are often used for preparing funeral wreaths.

HELIOPSIS Pers.

Annual or perennial herbs; leaves opposite, 3-nerved, dentate; heads usually large, long-pedunculate, terminal and axillary, radiate, yellow; involucre hemispheric, the phyllaries oblong or lanceolate, imbricate in 2–3 series; receptacle convex or conic, paleaceous; ray flowers pistillate, fertile, the large rays firm and persistent upon the achene; disk flowers perfect; achenes obtusely 3–4-angulate, truncate; pappus none or of 2–4 teeth, or a coroniform border.—Probably no other species reach Central America.

Heliopsis buphthalmoides (Jacq.) Dunal. Slopes of Volcán de Irazú, above Cartago, at 1,400 meters or less. Mexico to Peru. Plants about a meter high, branched, rather slender, sparsely pubescent with short and rather soft hairs, or almost glabrous; leaves long-petiolate, thin, green, ovate or broadly ovate, acute or acuminate, truncate or rounded at the base, rather coarsely dentate; heads showy, on long, naked peduncles, the disk more than 1 cm. broad, the spreading, rather broad rays 1.5 cm. long.

HIDALGOA Llave & Lexarza

Plants scandent, herbaceous or suffrutescent, slender, glabrous or nearly so; leaves opposite, compound, ternate or biternate, the leaflets petiolulate, broad, serrate, the lateral ones often parted; heads axillary, solitary, radiate, long-pedunculate, the rays red or orange; ray flowers pistillate or neutral, the disk flowers perfect, fertile; involucre biseriate, the inner phyllaries few and broad, subequal, connate at the base, the outer ones smaller, foliaceous; receptacle plane, paleaceous; achenes oblong or obovate, dorsally compressed, rounded at the apex, naked or obsoletely 2-dentate.—The genus consists of a single species. The group is noteworthy for its scandent habit and apparently compound leaves.

Hidalgoa ternata Llave & Lex. *H. Wercklei* Hook. f. Bot. Mag. 125: *pl. 7684.* 1899 (described from cultivated material said to have been obtained in Costa Rica by Wercklé). *Childsia Wercklei* Childs ex Hook. f. loc. cit. in syn. Frequent in thickets or forest in some places in the mountains of Guanacaste, 700 meters; region of La Palma de San José. Mexico to Ecuador. A large, chiefly herbaceous vine; leaves ternate and with 3 leaflets, or biternate, the leaflets ovate or broadly ovate, sometimes elliptic, thin, acute or acuminate, coarsely serrate; pseudostipules orbicular, herbaceous; disk about 13 mm. long; rays 2 cm. long or more, orange-red.

HIERACIUM L.

Perennial herbs, usually pilose; leaves alternate or chiefly basal, entire to pinnatifid; heads medium-sized or rather large, commonly yellow, solitary, corymbose, or paniculate; involucre cylindric to hemispheric, the principal phyllaries 1–3-seriate, the outer ones shorter; receptacle flat, naked or short-fimbrillate; corollas all alike, liguliform; achenes oblong or fusiform, not rostrate, 10–15-costate, terete or 4–5-angulate; pappus of 1–2 rows of rather stiff, brownish bristles.—A few other species have been collected in Central America.

Hieracium abscissum Less. Oak forest in the region of Dota, and doubtless elsewhere. Extending to Mexico. Plants slender, erect, about 60 cm. high or less, minutely glandular, deflexed-pilose near the base with long, white hairs, leafy below; leaves setulose and pilose, borne chiefly at or near the base of the stem, 25 cm. long and 2.5 cm. wide or usually much smaller, subobtuse, remotely repand-denticulate; heads paniculate, numerous; involucre 5–7 mm. long, minutely glandular, floccose; achenes black, 2–2.5 mm. long, columnar.

Hieracium frigidum Wedd. is reported by Klatt from Cerro de Buena Vista, but the record needs verification. Probably the plant so reported is one of the following species.

Hieracium irasuense Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 113. 1853. *Papelillo macho.* Volcán de Irazú, 2,850 meters, *Oersted.* In thickets or meadows, upper slopes of Irazú and Turrialba; also near Aserrí; chiefly at 2,400–3,400 meters. Endemic. Plants about 30 cm. high, short-pubescent and glandular-pilose, the cauline leaves mostly reduced and bractlike; basal leaves lanceolate, 7–10 cm. long, entire or glandular-serrate, long-pilose above, densely lanate beneath with long, white hairs; heads corymbose, yellow, the involucre 6 mm. long, rather densely covered with intermixed simple and glandular hairs; achenes subfusiform, 10-costate.

Hieracium sphagnicola Blake, Journ. Wash. Acad. Sci. 17: 62. 1927. Open sphagnum bog, Laguna de La Chonta, northeast of Santa María de Dota, Prov. San José, 2,000 meters, *Standley 42139.* Known certainly only from the original locality, but a collection from Cerro Gallito is probably conspecific. Basal leaves oblanceolate, 17 cm. long or less, sparsely long-pilose; stems sparsely long-pilose below, with 2 or fewer leaves below the middle; heads 5–8, cymose, the involucre 8–11 mm. long, sparsely pilose and stipitate-glandular; achenes slightly tapering above or almost columnar, 3–4 mm. long.

Hieracium Standleyi Blake, Journ. Wash. Acad. Sci. 17: 64. 1927. In paramo, Cerro de Las Vueltas, Prov. San José, 3,000 meters, *Standley & Valerio 43624.* Known only from the original collection. Plants lanate at the base, the stems scapose; basal leaves obovate, 3.5–4 cm. long, rounded and apiculate at the apex, obscurely denticulate, sparsely long-pilose; heads few, the involucre 9–11 mm. long, pilose at the base, not glandular; achenes deep purple-brown, slightly tapering above, 2.5–3.8 mm. long.

Hinterhubera Laseguei Wedd. was reported from Costa Rica by Klatt, on the basis of *Pittier 3431* from Cerro de Buena Vista. The collection is actually *Alchemilla ocreata* Donn. Smith (see p. 478; Rosaceae).

HYMENOSTEPHIUM Benth.

Tall, coarse herbs, or the plants often suffrutescent; leaves chiefly opposite, petiolate, ovate or lanceolate, dentate; heads small or medium-sized, cymose or cymose-paniculate, radiate, yellow; involucre 2–3-seriate, the bracts subequal or the outer ones gradually shorter, ovate or lance-ovate, usually narrow and not foliaceous-appendaged; achenes obovoid, somewhat compressed, pubescent or glabrous; pappus of a few unequal squamellae without awns, or none.—One or two other species grow in northern Central America.

Hymenostephium cordatum (Hook. & Arn.) Blake. *Gymnopsis costaricensis* Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 90. 1853 (Aguacate and Ujarrás, *Oersted*). *Aspilia costaricensis* Klatt, Bull. Soc. Bot. Belg. 31: 201. 1892. Common in thickets or forest, Meseta Central to the Atlantic coast, and in the upper part of the Pacific tierra caliente; region of San Ramón; mostly at 1,300 meters or less. Mexico to Colombia. Plants herbaceous or somewhat shrubby, usually 1–2 meters high, occasionally subscandent, the branches sparsely strigillose or glabrate; leaves slender-petiolate, mostly 6–10 cm. long, broadly ovate to lance-ovate, acuminate, usually abruptly narrowed at the broad base, coarsely serrate, strigillose beneath; heads numerous, in small cymes, the involucre 5 mm. high; achenes glabrous or pubescent, the pappus none or of a few unequal squamellae. Material reported by Klatt as *Gymnolomia rudbeckioides* HBK., a South American species of *Hymenostephium,* may be referable here.

Hymenostephium guatemalense (Rob. & Greenm.) Blake. *H. pilosulum* Blake. Thickets in the regions of San José and Cartago, 1,100–1,300 meters. Panama to southern Mexico. Similar to the preceding species, to which it is rather too closely related, but differing in the more abundant and spreading pubescence of the branches and lower leaf surface.

HYPOCHAERIS L.

Low, perennial herbs, the stems usually naked, often branched; leaves all or chiefly basal, entire to pinnatifid; heads rather large, long-pedunculate, yellow, the corollas all liguliform; involucre cylindric to campanulate, the phyllaries green, narrow, imbricate in several series, the outer shorter; receptacle flat, paleaceous; achenes oblong to linear, 10-costate, rostrate, the pappus of plumose bristles.—No species are native in North America.

Hypochaeris radicata L. *Margarita amarilla.* Common in meadows of the middle and upper slopes of the central volcanoes; region of San Ramón; at 1,200–2,700 meters. Native of Europe, but rather widely naturalized in America. Stems glabrous, 30–60 cm. high, usually branched; leaves oblanceolate to obovate, dentate to pinnatifid, 5–15 cm. long, hirsute; heads about 2.5 cm. high, the phyllaries glabrous or sparsely pilose.

ICHTHYOTHERE Mart.

Herbs or somewhat suffrutescent plants, glabrous or pubescent; leaves opposite, sessile or petiolate, entire or somewhat serrate; heads small, disciform, whitish, sessile or short-pedicellate, in small, dense cymes; outer phyllaries 1–2-seriate, small, the inner ones and the outer paleae of the disk broad, subtending the perfect flowers; receptacle oblong or linear; achenes obovoid, dorsally compressed, smooth or costate; pappus none.—The other species of the genus are South American.

Ichthyothere scandens Blake. Regions of Guápiles and El General, in the tierra caliente. Venezuela to Peru. A suffrutescent vine(?), the branches appressed-pilose; leaves slender-petiolate, ovate or lance-ovate, 7–11 cm. long, falcate-acuminate, acute or acuminate at the base, serrulate, sparsely sordid-pubescent on the veins, 3–5-plinerved; heads pedicellate, 4.5 mm. high; outer phyllaries subulate-triangular, the inner obovoid; achenes about 8-costate, truncate, glabrous, 2–3 mm. long.

ISOCARPHA R. Br.

Erect, slender herbs; leaves opposite or alternate, petiolate or sessile, entire or dentate; heads rather small, discoid, whitish, mostly solitary at the end of a long peduncle; phyllaries narrow, small, 2–3-seriate, rigid-tipped; receptacle conic, paleaceous; achenes 4–5-angulate, truncate; pappus none.—No other species are found in Central America.

Isocarpha atriplicifolia (L.) R. Br. Nicoya; Patarrá. West Indies and northern South America. Rather similar to the more common *I. oppositifolia,* but more branched, the leaves broader, chiefly ovate, usually conspicuously dentate; petioles auriculate-dilated at the base; heads shorter, very obtuse at the base; achenes pubescent.

Isocarpha oppositifolia (L.) R. Br. Isla de Chira, Pacific coast, *M. Valerio.* Texas and Mexico to Venezuela and West Indies. Plants branched, erect, pubescent, usually less than a meter high; leaves sessile or short-petiolate, lanceolate or linear-lanceolate, obtuse to attenuate, acute at the base, entire or nearly so; petioles not auriculate at the base; phyllaries glandular and appressed-pilosulous; achenes 2 mm. long, glabrous.

Iva annua L., a South American plant, was reported by Klatt from "Bolenak (Haut Zhorquín)" on the basis of *Pittier 8656.* I have not seen this collection, and have no idea of what it may be.

JAEGERIA HBK.

Slender, branched annuals, the pubescence usually abundant; leaves opposite, dentate; heads very small, radiate, yellow, terminal or axillary, long-pedunculate, solitary or cymose, the rays minute and inconspicuous; involucre campanulate, the phyllaries 1–2-seriate, subequal; receptacle convex or conic, paleaceous; achenes obscurely 5-angulate, glabrous; pappus none.—Probably a single species occurs in Central America.

Jaegeria hirta (Lag.) Less. *Mielcilla.* Common in meadows of the central region, especially on the mountain slopes; mostly at 1,000–2,600 meters. Widely distributed in tropical America. Plants slender and rather weak, usually 30 cm. high or less, rather densely pilose throughout; leaves sessile, oblong or ovate-oblong, 2–4 cm. long, obtuse or subacute, 3-plinerved, often entire; heads 3–4 mm. long. In general appearance the plant is much like *Galinsoga,* but differs at first glance in its yellow rather than white or pink rays. The rays, however, are so small that they are easily overlooked.

JUNGIA L. f.

Herbs or shrubs, erect or subscandent; leaves alternate, usually rounded-cordate, dentate or lobate, most often tomentose beneath; heads small or medium-sized, paniculate at the ends of the branches, the flowers all alike or nearly so, the heads appearing discoid;

involucre campanulate or cylindric, the phyllaries subequal, 1–2-seriate, the outer sometimes shorter; receptacle paleaceous; achenes oblong or linear, subterete, 5-costate, contracted above and rostrate; pappus bristles 1-seriate, plumose to denticulate.—No other species are known from North America.

Jungia ferruginea L. f. Occasional in forests of the higher mountains, 1,600–2,600 meters. Colombia. Plants scandent, the stout branches more or less brownish-tomentose; leaves slender-petiolate, cordate-orbicular, mostly 5–9 cm. wide, shallowly or deeply cordate at the base, shallowly lobate and coarsely crenate, densely villous above, densely brownish-tomentose beneath; heads white or yellow, in small, dense cymes, the involucre 4 mm. long, densely pubescent; achenes glabrous, scarcely more than 2 mm. long. Material of this genus at hand for study is altogether inadequate. There is some probability that the plant of Central America represents a distinct and endemic species. Part of the material was referred by Klatt to *J. spectabilis* Don.

LACTUCA L.

Tall herbs with milky sap; leaves alternate, entire to pinnatifid; heads small, paniculate, yellow, blue or white; involucre cylindric, the phyllaries imbricate in several series, the outer ones shorter; receptacle plane, naked; heads appearing radiate, the corollas liguliform; achenes oval to linear, compressed, 3–5-costate, contracted into a slender beak; pappus of numerous soft, capillary, white or brown bristles.—One species is native in northern Central America.

Lactuca sativa L. *Lechuga. Lettuce.* The garden lettuce, believed to be a native of Asia, is cultivated as commonly in Costa Rica as in other parts of the earth for use as a salad plant. It thrives at all elevations.

LAESTADIA Kunth

Perennial herbs, sometimes suffrutescent, cespitose or prostrate, glabrous or pubescent; leaves alternate or subopposite, small, crowded, entire; heads small, discoid, solitary on elongate, terminal and axillary peduncles, violaceous; involucre hemispheric, the phyllaries about 2-seriate, narrow, subequal; receptacle plane or subconvex, naked; achenes scarcely compressed, 7–10-costate, glabrous, contracted at the apex into a short beak; pappus none.—No other species are known in North America.

Laestadia costaricensis Blake, Contr. U. S. Nat. Herb. 22: 593. 1924. Cerro de Las Vueltas, 3,000 meters, *Pittier 10500.* Known only from the original locality, where it was collected also by Juvenal Valerio and the present writer. Endemic. A low plant, forming dense tufts, the stems 25 cm. long or less, rooting at the nodes, very slender, puberulent; leaves narrowly spatulate or linear-oblanceolate, 6–11 mm. long, acute, entire, sparsely pubescent; heads 3 mm. high, the phyllaries glandular and ciliate; achenes 1.5 mm. long. The same plant was reported by Klatt from Cerro de La Muerte (Cerro de Buena Vista) as *L. Lechleri* Schultz Bip., a South American species.

LIABUM Adans.

Reference: Rydberg, N. Amer. Fl. 34: 289–301. 1927.

Perennial herbs or shrubs, often epiphytic and more or less scandent; leaves opposite, entire or dentate; heads radiate or discoid, yellow, the phyllaries imbricate in 3 or more series; receptacle naked or often hirsute or paleaceous; ray flowers pistillate and fertile, the disk flowers perfect and fertile; achenes cylindric, 10–15-costate; pappus of numerous capillary, scabrous bristles in a single series, a few short ones sometimes present.—A few additional species exist in Central America.

Liabum Bourgeaui Hieron. Occasional in thickets or forest of the central region, at Cartago and on the mountain slopes at middle elevations; region of San Ramón; extending into the upper part of the tierra caliente. Panama to Mexico. A shrub, terrestrial or epiphytic, 1.5–2.5 meters high, the branches white-tomentose; petioles broadly winged, conspicuously dilated and clasping at the base; leaf blades ovate to elliptic, 8–20 cm. long, acuminate, contracted and decurrent at the base, denticulate, glabrate and green above, densely white-tomentose beneath, triplinerved; involucres 8–9 mm. high, the phyllaries all acute or attenuate; achenes 1 mm. long, hispidulous.

Liabum discolor (Hook. & Arn.) Benth. & Hook. In forest, slopes of Barba and Poás, mostly at 2,200 meters or less. Ranging to Mexico. A shrub of 3–4.5 meters, the stout branches glabrous; leaves slender-petiolate, broadly ovate to lance-ovate, 8–15 cm. long, acute or acuminate, more or less narrowed at the base, denticulate, glabrous above, white-tomentose beneath; involucre 8 mm. high, the inner phyllaries rounded at the apex; achenes glabrous.

Liabum igniarium (Humb. & Bonpl.) Less. Reported from the region of Térraba and Boruca by Klatt, and from Costa Rica by Rydberg, but I have seen no Costa Rican specimens. Extending to Peru. Similar in most characters to *L. Bourgeaui*, but the petioles naked, abruptly dilated at the base into large, green, rounded pseudostipules.

Liabum polyanthum Klatt, Bull. Soc. Bot. Belg. 31: 209. 1892. *Sinclairia polyantha* Rydb. N. Amer. Fl. 34: 299. 1927. *S. Pittieri* Rydb. op. cit. 300 (near Alajuelita, Prov. San José, *Pittier 9093*). El General, *Pittier 4319*. Frequent in forests of central region, descending into the upper part of the tierra caliente, mostly at 500–1,500 meters; region of San Ramón; Guanacaste. Endemic. Branches laxly floccose-tomentose; leaves slender-petiolate, oval to rounded, 10–15 cm. long, acute or acutish, rounded at the base, glabrate above, white-tomentose beneath; heads numerous, radiate, the involucre 7 mm. high, the inner phyllaries rounded at the apex; achenes strigose.

Liabum Tonduzii Robinson, Proc. Bost. Soc. Nat. Hist. 31: 270. 1904. *Sinclairia Tonduzii* Rydb. N. Amer. Fl. 34: 298. 1927. Río Virilla near San José, 1,100 meters, *Tonduz 7064*. Collected also at Santa María de Dota. Endemic. A shrub of 3–4.5 meters, the young branches tomentose and somewhat brown-hirsute; leaves petiolate, rhombic-ovate, 7–15 cm. long, acuminate, rounded to subacute at the base, green and scaberulous above, densely white-tomentose beneath; involucres 6–7 mm. high, the inner phyllaries rounded at the apex; achenes hirsutulous, 2.5 mm. long.

Liabum Valerii Standl., sp. nov.—Frutex scandens, ramis gracilibus primo tomento adpresso albido dense obtectis, internodiis elongatis; folia inter minora petiolata membranacea, petiolo gracili 15–18 mm. longo dense tomentoso basi non vel vix dilatato; lamina lanceolato-oblonga 9.5–13 cm. longa 2.5–4.5 cm. lata longe sensim attenuato-acuminata, basi rotundata usque subacuta, remote obscure serrulata, supra primo laxe floccosa cito glabrata, subtus ubique tomento denso pallide brunnescente vel fere albo obtecta; capitula in cymas axillares parvas breviter pedunculatas disposita, graciliter usque 8 mm. longe pedicellata; phyllaria 3–4-seriata lineari-lanceolata vel lanceolata, omnia acuta vel interiora acute attenuata, dorso glabrata, apicem versus ciliata, involucro ca. 5 mm. longo; capitula ut videtur discoidea, floribus non visis; achaenia immatura paullo ultra 2 mm. longa breviter hispidula, pappi setis fulvis 6 mm. longis.

—In wet forest, near Finca La Cima, above Los Lotes, north of Copey, Prov. San José, 2,100–2,400 meters, *Standley 42555.* Distinguished from all other Costa Rican species by the definitely scandent habit and narrow leaves.

Liabum vulcanicum Klatt. La Hondura de San José, in wet forest. Colombia. Plants about 2 meters high, chiefly herbaceous, the stems fistulous, branched; leaves long-petiolate, broadly ovate-cordate, about 20 cm. long and wide, sinuate-lobate and dentate, green but somewhat pilose on both surfaces; heads radiate, long-pedicellate and subumbellate, forming a large panicle; phyllaries obtuse, broad; achenes glabrous. Very different in appearance from other Central American species because of the lobate leaves, green on the lower surface.

LYCOSERIS Cass.

Erect or subscandent shrubs, the branches usually at least recurved; leaves alternate, sessile or short-petiolate, commonly entire, glabrous above, more or less tomentose beneath, 3–5-plinerved; heads dioecious, very large, solitary or few at the ends of the branches, the pistillate usually larger than the staminate, the corollas orange-yellow, the outer ones elongate and liguliform; involucre campanulate or subglobose, the phyllaries multiseriate, imbricate, narrow, very numerous; receptacle plane, fimbrilliferous; achenes oblong or elongate, 5-costate and usually multistriate, glabrous; pappus of numerous slender bristles.—One other species occurs in Panama.

Lycoseris crocata (Bertol.) Blake. *L. squarrosa* Benth. Bot. Voy. Sulph. 121. 1844 (based in part upon material from Nicoya). *L. macrocephala* Greenm. Proc. Amer. Acad. 39: 119. 1903 (forests of the hills of Nicoya, *Tonduz 13602*). Region of Nicoya. Panama to Guatemala. A shrub with recurved and striate branches; leaves lanceolate or lance-oblong, 3–5-plinerved, glabrous above, thinly white-lanate beneath; heads 2.5 cm. or more in diameter; phyllaries narrowly lanceolate, attenuate, rather densely arachnoid-tomentose.

Lycoseris grandis Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 11. 1853. *Onoseris grandis* Kuntze, Rev. Gen. 1: 354. 1891. San Mateo, *Oersted.* Region of San Mateo and at various places along the Pacific coast; Nicoya. Endemic(?). Similar to the preceding species, but the heads usually larger, the bracts broad, obtuse or merely apiculate, glabrous or nearly so.

MATRICARIA L.

Annual herbs, glabrous or somewhat pubescent, strong-scented; leaves alternate, once to thrice pinnatifid into narrow divisions; heads solitary or corymbose, radiate or discoid; involucre depressed to hemispheric, the phyllaries 2–4-seriate, somewhat imbricate, subequal, obtuse, scarious-marginate; receptacle conic to subglobose, naked; rays usually white, the disk yellow; achenes somewhat asymmetric, 3–5-costate on the inner side; pappus a more or less evident corona or margin.—No species are native in Central America.

Matricaria Chamomilla L. *Manzanilla.* Planted commonly in gardens for use in domestic medicine; sometimes escaping to waste ground. Native of Europe and Asia. Plants 50 cm. high or less, usually much branched, glabrous or nearly so; heads solitary at the ends of the branches, the rays white; involucre about 3 mm. high, the ligules 5–8 mm. long. A decoction of the plant is one of the local remedies for pains in the stomach.

MELAMPODIUM L.

Reference: B. L. Robinson, Synopsis of the genus *Melampodium*, Proc. Amer. Acad. 36: 455–466. 1901.

Annual or perennial herbs, pubescent or glabrate, usually dichotomous-branched; leaves opposite, entire to pinnate-lobate; heads small or medium-sized, radiate, yellow, pedunculate, inserted in the axils of the branches or of the leaves; involucre double, the outer phyllaries 4–5, broad, often connate at the base and accrescent after anthesis, the inner ones closely investing the ray flowers and closed above the achene after anthesis; receptacle convex or conic, paleaceous; achenes obovoid, without pappus.—A few other species are found in Central America.

Melampodium brachyglossum Donn. Smith. In thickets or waste ground, vicinity of San José and Cartago. Extending to Guatemala. Plants erect, sparsely branched, 90 cm. high or less, the stems pilose with weak, spreading hairs; leaves long-petiolate, deltoid-ovate, acute or acuminate, cuneate at the base and long-decurrent, remotely and inconspicuously dentate, rough-pilose; heads long-pedicellate, 4–5 mm. broad, the pedicels densely spreading-pilose, the outer phyllaries broad, obtuse, the rays minute, hidden by the phyllaries.

Melampodium divaricatum (Rich.) DC. *M. paludosum* HBK. Common in waste and cultivated ground of the Pacific tierra caliente;

Guanacaste; the species should be found also in the Atlantic tierra caliente, but I find no specimens or reports for that region; reported from the region of Dota. Mexico to West Indies and northern South America. Plants erect, rather stout, often much branched, a meter high or less, the stems usually glabrous or nearly so; leaves on long or short petioles, rather large, broadly ovate to lance-ovate, acute or acuminate, acute at the base and decurrent, rather coarsely dentate, rough-pubescent or glabrate; heads mostly long-pedunculate, about 8 mm. broad, the outer phyllaries broad, green, obtuse, the rays short but conspicuous. One of the most common weeds of the tierra caliente of Central America.

Melampodium flaccidum Benth. Waste ground or thickets, often in cultivated fields, Meseta Central to the tierra caliente. Extending to Mexico. Similar to *M. divaricatum*, but often lower, rather weak, frequently decumbent; heads mostly on short pedicels, or almost sessile, but sometimes long-pedicellate, about 7 mm. broad, the rays very small, hidden by the inner phyllaries.

Melampodium oblongifolium DC. *Mielilla.* In thickets or waste ground, regions of San José and Palmira, 1,000–1,800 meters. Extending to Mexico. Plants very slender, usually densely branched, sometimes a meter high, the stems pilose with long, spreading hairs; leaves small, ovate to narrowly lanceolate, acuminate, usually tapering to the base of the petiole, more or less serrate-dentate, rough-pubescent; heads very numerous, slender-pedicellate, 3–4 mm. broad, the outer phyllaries ovate or lanceolate, acute; rays minute. This has much smaller flower heads than any of the other species, and differs also in the small, narrow, acute phyllaries.

Melampodium perfoliatum (Cav.) HBK. Collected only at La Caja, San José, probably introduced, *M. Valerio 1345.* Mexico and Guatemala. Plants stout, erect, a meter high or less, branched, the stems glabrous; leaves broadly ovate, their bases enlarged and united about the stem, rough-pubescent; heads numerous, on long or short peduncles, larger than in the other species, the broad, green outer phyllaries 1–1.5 cm. long, the rays inconspicuous.

MELANTHERA Rohr

Perennial herbs, usually large and coarse, with rough pubescence; leaves opposite, petiolate, dentate, often hastate-lobate; heads small, discoid, whitish, pedunculate; involucre hemispheric, the phyllaries few, ovate or lanceolate, subequal, imbricate in 2–3 series; receptacle convex, paleaceous; achenes 4-angulate, the pappus of caducous awns.—At least one other species is known from Central America.

Melanthera nivea (L.) Small. *Paira.* *M. aspera* (Jacq.) Rich.; *M. deltoidea* Rich.; *M. lanceolata* Benth.; *M. oxylepis* DC. Common in thickets or waste ground, often in cultivated fields, Meseta Central to the coasts; region of San Ramón; Guanacaste. Generally distributed in tropical America. Plants erect, much branched, sometimes 3 meters high and then suffrutescent, rarely subscandent; leaves mostly ovate-oblong or lanceolate, hastate-lobate, serrate, 3-plinerved, very rough; heads about 1 cm. broad, the black anthers conspicuous against the general white of the head; pappus of 2–4 short bristles. The plant is a common weed throughout a great part of Central America. There is probably no sadder spectacle in the field of systematic botany than the seriousness with which a large number of botanists have labored for a century or more, shuffling and reshuffling the plants, or rather specimens, of this small genus, painfully describing their own new "species," while reducing to synonymy those of earlier workers. As more and more material accumulates in herbaria, it becomes more apparent that the so-called species have no systematic value whatever, except for a very few localized plants that really do have good differential characters. Any one who has examined even casually the variation of leaf form in a colony of this plant, or even upon one individual, will have scant regard for most "species" of *Melanthera.* It is scarcely necessary to add that characters supposed to exist in the phyllaries and disk scales have no greater merit as specific characters.

MIKANIA Willd.

Reference: Robinson, Synopsis of the Mikanias of Costa Rica, Proc. Bost. Soc. Nat. Hist. 31: 254–257. 1904.

Plants scandent, herbaceous or woody; leaves opposite, petiolate; heads discoid, white or pink, spicate, racemose, corymbose, or glomerate and often paniculate; involucre narrow, the phyllaries 4, narrow, subequal; flowers 4; receptacle naked; achenes truncate, 5-angulate; pappus of numerous capillary bristles in 1–2 series.—A few other species are known from Central America. The Costa Rican ones are none too well known, several of them being based upon single collections. It seems rather probable, too, that the available material may represent a greater number of forms than are named below.

Mikania bogotensis Benth. Reported by Robinson from Palmares del General, Diquís Valley, *Pittier 12030*. Colombia. Plants slender, nearly or quite glabrous; leaves ovate, acuminate, subcordate at the base, thin, 3-nerved from the base; panicle large and open; heads sessile, spicate, 5 mm. high; phyllaries subobtuse; pappus rufous.

Mikania cordifolia (L. f.) Willd. Frequent in forest and thickets of the central mountains, ascending to the upper part of the tierra caliente; region of San Ramón; Guanacaste. Widely distributed in tropical America. A small or large vine, herbaceous or somewhat woody, the stems tomentose or tomentulose; leaves ovate, acute or acuminate, cordate at the base, undulate-dentate to almost entire, 3–5-nerved from the base, villous to sericeous, usually pale; heads dirty white, fragrant, corymbose, pedicellate; phyllaries 6–8 mm. long, pubescent or glabrate; achenes glabrous, the pappus dull white, becoming rufescent.

Mikania cristata Robinson, Proc. Amer. Acad. 47: 195. 1911. La Palma de San José, 1,460 meters, *Tonduz 12583*. Known, apparently, only from the original material. Stems puberulent-tomentulose; leaves long-petiolate, broadly ovate, acuminate, deeply cordate at the base, subentire, velutinous-tomentose, 3–5-nerved; petioles dilated at the base and connected by a cristate, appendaged stipular margin; heads corymbose, pedicellate; phyllaries subobtuse, 6 mm. long, puberulent dorsally; achenes glabrous, the pappus rufous. I have seen no material of this species.

Mikania eupatorioides Blake, Journ. Wash. Acad. Sci. 28: 1938. Edge of forest, El General, Prov. San José, 1,525 meters, *Skutch 3041*. Endemic, and known only from the region of the type. A woody vine, the branches pilosulous; leaves slender-petiolate, ovate or lance-ovate, 11–15 cm. long, long-acuminate, cuneate or rounded-cuneate at the base, entire or very obscurely denticulate, 5-plinerved, subglandular-puberulous above and sparsely pilosulous, similarly pubescent beneath; individual panicles convex, forming an open, leafy, thyrsoid panicle; pedicels 2 mm. long or less; heads 7–9 mm. high, the phyllaries puberulous toward the tip; corollas 4.5 mm. long; achenes 3 mm. long, the pappus flesh-colored, 4.2 mm. long.

Mikania Guaco Humb. & Bonpl. *Guaco. M. olivacea* Klatt, Bull. Soc. Bot. Belg. 31: 195. 1892 (forests of Buenos Aires, 200–300 meters, *Pittier 4433*). Occasional in thickets or forest of the tierra caliente, also in the central mountains, ascending to 1,500 meters;

region of San Ramón. Widely distributed in tropical America. Plants herbaceous or frequently woody, the stems glabrate; leaves ovate, often very large, acute or acuminate, cuneate-decurrent at the base, undulate or denticulate to entire, puberulent or glabrate above, tomentulose beneath, especially on the nerves, or glabrate, pinnate-nerved; heads dirty white, about 1 cm. long, mostly sessile and glomerate, forming a large, ovoid panicle; phyllaries puberulent, rounded at the apex; pappus buff or fulvous. In Costa Rica, as in other Central American countries, this plant is famous as a remedy for fevers and snake bites.

Mikania Holwayana Robinson. Regions of Orosi and El Muñeco. Ecuador. Stems puberulent or glabrate; leaves broadly ovate, short-acuminate, cordate at the base, denticulate or sinuate, puberulent above, whitish-tomentulose beneath, 3–5-nerved from the base; heads about 1 cm. long, pedicellate, forming a large, pyramidal panicle; phyllaries obovate-elliptic, 6.5 mm. long, obscurely puberulent; corollas creamy white; achenes glabrous, the bristles white.

Mikania Houstoniana (L.) Robinson. Forests and thickets of the tierra caliente; region of San Ramón; Guanacaste. Mexico to Bolivia. A woody or herbaceous vine, the stems puberulent to pilose; leaves broadly ovate, acuminate, rounded at the base, entire, glabrous or nearly so, 5-nerved from near the base; heads 4–6 mm. high, racemose, short-pedicellate, white; phyllaries oblong, subacute, sparsely puberulent; pappus whitish.

Mikania hylibates Robinson, Contr. Gray Herb. 77: 52. 1926. Wet forest, El Muñeco, south of Navarro, Prov. Cartago, 1,400 meters, *Standley 33848*. Known only from the original material. A large vine, glabrous except in the puberulent inflorescence; leaves oblong, long-acuminate, rounded to subacute at the base, entire, coriaceous, 3–5-nerved from the base; heads 8 mm. long, sessile, the phyllaries oblong, obtuse, puberulent; corollas dirty white; pappus dirty white.

Mikania leiostachya Benth. Thickets and forest of the Atlantic tierra caliente; region of San Ramón. Honduras to Ecuador. A slender vine, almost glabrous; leaves ovate, acuminate, rounded at the base, subcoriaceous, entire; heads white, 7 mm. long, sessile, spicate, forming large, lax panicles; phyllaries ovate-oblong, obtuse, pubescent or glabrate; corollas white; achenes glabrous, the pappus white.

Mikania micrantha HBK. In thickets or forest, often forming dense tangles over shrubbery, Meseta Central to the upper part of the Pacific tierra caliente; region of San Ramón; Guanacaste. Widely distributed in tropical America. Plants chiefly herbaceous, almost glabrous or pubescent; leaves thin, ovate or broadly ovate, often sagittate or hastate, with a deep, open basal sinus, acuminate, crenate-undulate or dentate, mostly 3-nerved from the base, usually glabrate; heads dirty white, only 4–5.5 mm. long, pedicellate, corymbose; phyllaries obovate-oblong, acute or short-acuminate; pappus white at first, becoming fulvous. Probably the most common species of Central America. It has been reported from Costa Rica under the name *M. scandens* Willd.

Mikania nubigena Robinson, Contr. Gray Herb. 77: 57. 1926. Wet forest, Las Nubes, Prov. San José, 1,500–1,900 meters, *Standley 38509.* Material from the Río Navarro is perhaps referable here. Endemic. Plants glabrous except for the puberulent inflorescence; leaves ovate-oblong, caudate-acuminate, rounded to subacute at the base, remotely cuspidate-denticulate, pinnately 5-nerved, 8–10 cm. long; heads white, 7 mm. long, sessile, forming a terminal, compound panicle; phyllaries narrowly oblong, rounded at the apex, ciliolate, dorsally glabrous; pappus yellowish white.

Mikania Pittieri Robinson, Proc. Bost. Soc. Nat. Hist. 31: 255. 1904. Cuesta de Los Borucas, *Pittier 10540.* Reported by Cufodontis from Guayabillos, Volcán de Irazú, 2,250 meters. Endemic. Plants glabrous except in the puberulent inflorescence; leaves ovate, caudate-acuminate, rounded at the base, subcoriaceous, entire, pinnate-nerved; heads sessile, forming a dense, thyrsoid panicle; phyllaries narrowly oblong, somewhat dilated and obtuse at the apex, glabrate, 5–6 mm. long; achenes glabrous, 4 mm. long, longer than the corolla.

Mikania riparia Greenm. ex Robinson, Proc. Bost. Soc. Nat. Hist. 31: 255. 1904. In thickets, Río de Las Vueltas, Tucurrique, 635 meters, *Tonduz 13163.* Thickets and forest of the tierra caliente, ascending to the region of Dota and the mountains south of Cartago; El General; region of San Ramón. Endemic. Plants slender, herbaceous, glabrous except in the puberulent inflorescence; leaves thin, broadly ovate, usually small, caudate-acuminate, cordate at the base, near the base coarsely dentate or undulate and often hastate; heads dirty white, short-pedicellate, racemose, forming a large, open, leafy panicle; phyllaries narrowly oblong, obtuse or subacute, glabrous, or puberulent at the apex; achenes glabrous, the pappus pale reddish brown.

Mikania Skutchii Blake, Brittonia 2: 333. 1937. In forest, vicinity of El General, Prov. San José, 1,130 meters, *Skutch 2514*. Frequent in thickets and forest of the central region; regions of Dota and San Ramón; chiefly at 1,000–1,800 meters, common in many localities. Endemic. A large or small vine, herbaceous or more or less woody, the stems densely fulvous- or rufous-pilose with soft, spreading hairs; leaves ovate or lance-ovate, mostly 8–20 cm. long, acuminate, rounded or subcordate at the base, densely pilose, remotely denticulate or subentire, pinnate-nerved; heads small, dirty white, sessile or nearly so, glomerate, forming a large, thyrsiform panicle; phyllaries oblong, obtuse, 5 cm. long, pilose; achenes sparsely pilose toward the apex, the pappus whitish, becoming fulvous. This was reported from Costa Rica by Robinson as *M. hirsutissima* DC., a species of Brazil and Paraguay.

Mikania Standleyi Robinson, Contr. Gray Herb. 77: 59. 1926. Wet forest, La Estrella, Prov. Cartago, *Standley 39155*. Collected also at La Palma de San José and El General. Endemic. A large, more or less woody vine, the stems fulvous-puberulent; leaves ovate, acuminate, cordate at the base, denticulate, glabrous above, puberulent beneath, 3–5-nerved from the base; heads white or greenish yellow, pedicellate, forming a large, pyramidal panicle; phyllaries 6.5 mm. long, puberulent toward the apex, the outer ones subacute, the inner rounded at the apex; achenes glabrous, the pappus fulvous.

Mikania Tonduzii Robinson, Proc. Bost. Soc. Nat. Hist. 31: 256. 1904. Tucurrique, 635 meters, *Tonduz 13274*. Forests of Guanacaste. Extending to southern Mexico. A large, herbaceous vine, glabrous or nearly so except in the puberulent inflorescence; leaves ovate, coriaceous, acuminate, rounded-cordate at the base, entire, glabrous and lustrous above, puberulent or glabrate beneath; heads white, sessile, forming globose glomerules, these disposed in large, leafy panicles; phyllaries oblong, 3 mm. long, griseous-tomentulose, rounded at the apex; achenes glabrous, 2 mm. long, the pappus more or less fulvous.

Mikania vitifolia DC. *M. punctata* Klatt, Bull. Soc. Bot. Belg. 31: 195. 1892. El General, 600 meters, *Pittier 3434*. Frequent in thickets and forest of the tierra caliente, ascending to about 1,000 meters; region of San Ramón; Guanacaste. Southern Mexico to

Brazil. A large vine, the stems somewhat pilose or almost glabrous; leaves ovate to triangular, acuminate, cordate at the base, 5–7-nerved from the base, undulate-dentate and sometimes subhastate, punctate, rusty-pubescent beneath along the nerves and veins; upper leaves triangular-ovate, rounded to truncate at the base; heads white, sessile or nearly so, glomerate, forming a compound panicle; phyllaries linear-oblong, 5 mm. long, pubescent toward the apex; pappus dull white, becoming reddish brown.

MILLERIA L.

Tall, rather slender, annual herbs, somewhat villosulous or glabrate; leaves opposite, large, thin, petiolate; heads very small, yellow, radiate, arranged in open, paniculate cymes; involucre oblique-subglobose, somewhat enlarged in fruit and closed above the single achene, the bracts few, subherbaceous, one much larger than the others, cucullate; receptacle naked; ray flower 1, fertile, the disk flowers 4 or fewer, sterile; achene obovoid, compressed, glabrous, without pappus.—The genus consists of a single species.

Milleria quinqueflora L. Thickets or waste ground of the Pacific tierra caliente; region of San Ramón; Guanacaste. Widely distributed in tropical America. Plants often a meter high or more; leaves broadly ovate, acuminate, usually long-decurrent upon the petiole, the upper leaves often sessile; flower heads in fruit about 5 mm. broad. The plant is a weedy and unattractive one, common in some parts of Central America.

MONTANOA Cervantes

Reference: Robinson & Greenm. Proc. Amer. Acad. 34: 508. 1899.

Shrubs or trees; leaves mostly opposite, dentate to lobate or pinnatifid; heads medium-sized, radiate, usually very numerous, the rays white, the disk yellow; outer phyllaries 5–7, linear or oblong; rays neutral; paleae of the disk accrescent in fruit, usually scarious, often spinulose-tipped, greatly exceeding the obovoid, epappose achenes.—A few other species are native in Central America.

Montanoa dumicola Klatt, Bull. Soc. Bot. Belg. 31: 200. 1892. In hedge, Alajuelita, 1,000 meters, *Pittier 1454*. Frequent in hedges and forest about San José; region of San Ramón. Endemic. A shrub or tree, sometimes 9 meters high, with a broad, open crown, the bark gray, shredded; leaves slender-petiolate, the petioles not appendaged; blades ovate to broadly ovate, usually not lobate, obscurely dentate or subentire, sometimes shallowly trilobate, green and glabrate above, pale beneath and very densely and minutely pubescent; heads rather large, the phyllaries 4 mm. long, the rays about 10 and 1.5 cm. long; pales of the disk somewhat pubescent, spinulose-tipped.

Montanoa hibiscifolia Benth. *Tora.* *M. Wercklei* Berger, Gard. Chron. III. 50; 122. 1911 (based upon cultivated plants, grown from seeds sent to Italy by Wercklé). In thickets or forest, Meseta Central, ascending the slopes of Barba to 2,000 meters or more; region of San Ramón; Pejivalle; at 900 meters or more. Extending to southern Mexico. A shrub or small tree; leaves large, palmately 5–7-lobate, 20–30 cm. wide or smaller, often cordate at the base, the lobes acuminate, green and glabrate above, pale beneath and densely pubescent; petiole bearing near its apex 2 large, leafy auricles; heads numerous, in a large corymb; rays 8–10, about 1 cm. long; pales short-mucronate, somewhat pubescent at the apex. Like other species of this genus, this is a remarkably handsome and showy tree or shrub when in flower, and it deserves wide cultivation as an ornamental plant.

Montanoa Pittieri Rob. & Greenm. Proc. Amer. Acad. 34: 517. 1899. Alajuelita, *Pittier 1455*. Known, apparently, only from the original collection. Leaves green and glabrate above, pale beneath and appressed-puberulent, obsoletely trilobate, caudate-acuminate, auriculate-appendaged at the base; heads few, the phyllaries 4 mm. long, the rays about 8 and 1.5 cm. long; pales pubescent above, with a short, incurved point at the apex.

Montanoa xanthiifolia Schultz Bip. is reported by Klatt from El Rodeo, 750 meters, *Pittier*, but the determination is probably incorrect, the species ranging farther north.

NEUROLAENA R. Br.

Tall herbs, the leaves alternate, dentate, the lower ones often trilobate; heads paniculate, usually discoid, the involucre campanulate; phyllaries imbricate, 3–4-seriate, the outer ones gradually shorter, obtuse, membranous; receptacle plane, paleaceous; achenes oblong, glabrous or pubescent; pappus abundant, of slender, persistent, scabrous bristles in 1–2 series.—Two other species have been described from Central America.

Neurolaena lobata (L.) R. Br. *Gavilana, Capitana.* *Eupatorium Valverdeanum* Klatt, Bull. Soc. Bot. Belg. 31: 188. 1892 (Piedra del Convento, between El General and Buenos Aires, *Pittier*

3710). *E. chrysocephalum* Klatt, Leopoldina Bot. Beibl. 2. 1895 (also based on *Pittier 3710*). Common in thickets and waste ground of the tierra caliente; region of San Ramón; ascending to 1,050 meters. Widely distributed in tropical America. Plants stout, sometimes 3 meters high, simple or sparsely branched, the stems angulate, dense and finely pubescent; leaves mostly sessile, chiefly lanceolate, often very large, serrate, the lower ones mostly trilobate, rough-pubescent; heads forming large panicles, the involucre 5–6 mm. high; phyllaries 3-nerved, puberulent; flowers yellow; achenes black, 1.5 mm. long. The heads are much like those of the genus *Eupatorium*. The plant is used in domestic medicine in Central America.

OLIGANTHES Cass.

Reference: Gleason, N. Amer. Fl. 33: 102. 1922.

Shrubs or small trees; leaves broad, alternate, petiolate, more or less tomentose; heads discoid, 1–8-flowered, aggregate in dense, corymbiform panicles at the ends of the branches; involucre cylindric or narrowly campanulate, the phyllaries few, imbricate in several series; receptacle subconvex, naked; achenes striate or costate; pappus usually 2-seriate, of linear scales, these twisted toward the apex.—No other species are known from Central America.

Oliganthes discolor (HBK.) Schultz Bip. Reported from El General and from forests of Buenos Aires. Panama and Colombia. A shrub or small tree; leaves elliptic, 10–18 cm. long, acuminate, narrowed to the base, entire, glabrous above or nearly so, tomentose beneath; heads 2-flowered, 5 mm. high. Pittier lists the Térraba name as Shkur.

Oliganthes ferruginea Gleason, N. Amer. Fl. 33: 102. 1922. Forests of Alto de Mano de Tigre, Diquís Valley, 700 meters, *Pittier 12138*. Endemic. A tree of 10–12 meters; leaf blades 10–15 cm. long, acuminate, entire, narrowed to the acute base, glabrous above or nearly so, almost glabrous beneath; heads 2-flowered, 7 mm. high.

ONOSERIS DC.

Herbs or shrubs; leaves mostly basal, or alternate, white-tomentose beneath; heads large, appearing radiate, solitary or paniculate, the phyllaries grading into the bracts of the peduncles, the flowers mostly purple or red; involucre hemispheric or radiate, the phyllaries narrow, multiseriate, imbricate, the outer gradually shorter; receptacle naked or fimbrillose; achenes subterete, 5-costate, glabrous or pubescent; pappus bristles numerous, rather stiff, in 2 or more series.—At least one other species is known from Central America.

Onoseris silvatica Greenm. Proc. Amer. Acad. 49: 514. 1913. *Hoja quema.* Forests of the hills of Nicoya, *Tonduz 13597.* El Rodeo; Tabarcia; region of San Ramón. Probably endemic. Plants large and coarse, 1 meter high or more, simple or branched; leaves crowded near the base of the stem, large, runcinate-pinnatifid, acute or short-acuminate, the terminal segment more or less triangular-ovate and much larger than the others, rounded or cordate at the base, very coarsely dentate, green and glabrate above, densely white-tomentose beneath; heads numerous, purple-red, forming a large panicle, 2–2.5 cm. high; phyllaries densely white-tomentose; achenes sericeous. There is some doubt as to whether this is distinct from *O. onoseroides* (HBK.) Robinson.

The genus *Orthopappus* almost surely is represented on the Pacific slope of Costa Rica by *O. angustifolius* (Swartz) Gleason, but I have found no evidence of its having been collected.

OTOPAPPUS Benth.

Reference: Blake, Journ. Bot. 53: 229–235. 1915.

Shrubs, often scandent; leaves opposite, short-petiolate, dentate; heads radiate or discoid, yellow; involucre campanulate, the phyllaries graduate, 3–6-seriate, indurate, often herbaceous-tipped; achenes compressed, 2-winged, the wings decurrent on the awns; pappus of 2 awns and a lacerate corona of connate squamellae.—A few other species grow in Central America.

Otopappus verbesinoides Benth. In thickets or forest, upper part of the Pacific tierra caliente; region of San Ramón; Atlantic tierra caliente; Guanacaste. Extending to southern Mexico. A shrub of 3 meters or less, with recurved branches, or often scandent, the branches strigillose; leaves ovate to lance-oblong, 7–15 cm. long, acuminate, obtuse or acute at the base, somewhat serrulate; heads radiate, about 1 cm. high, in panicles of 3–5 at the ends of the branches; outer phyllaries with reflexed, linear to spatulate, herbaceous tips.

OYEDAEA DC.

Reference: Blake, Revision of the genus *Oyedaea*, Contr. U. S. Nat. Herb. 20: 411–422. 1921.

Chiefly shrubs; leaves opposite, entire or serrate; heads radiate, yellow, medium-sized; ray flowers neutral; involucre campanulate, the phyllaries graduated, 2–5-seriate, subequal or the outer ones longer, usually with herbaceous tips, the outer sometimes foliaceous; receptacle flat or subconvex, paleaceous; achenes compressed, oblong to cuneate-obovate, 2-winged; pappus of 2 slender, persistent awns and a corona of 6–12 narrow, fimbriate or lacerate, more or less united squamellae.—A single species is known from Central America.

Oyedaea verbesinoides DC. *Viguiera acuminata* Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 91. 1853 (Irazú, 2,745 meters, *Oersted 96, 106*). *V. macrophylla* Benth. in Oerst. loc. cit. (Cerro de Aguacate, 610 meters, *Oersted 104*). *O. acuminata* Benth. & Hook. ex Hemsl. Biol. Centr. Amer. Bot. 2: 176. 1881. *O. macrophylla* Benth. & Hook. ex Hemsl. loc. cit. *V. drymonia* Klatt, Leopoldina Bot. Beibl. 5. 1895 (Cañas Gordas, at 1,100 meters, *Pittier 7351*). Thickets and forest of the central region, descending to the Pacific tierra caliente, and ascending high on the slopes of the central mountains. Ranging south to Venezuela. A shrub or tree, sometimes 6 meters high, the branches pilose or hispid; leaves short-petiolate, thick, ovate or ovate-lanceolate, 8–20 cm. long, long-acuminate, cuneate at the base, serrate, densely rough-pubescent; heads large and showy, the involucre 1–1.5 cm. high; rays 1.5–2 cm. long, bright yellow; achenes 3.5–6 mm. long. The tree or shrub is abundant in some localities, as at Santa María de Dota and on the hills near Agua Caliente. It is showy and handsome because of the abundance of large, brightly colored flower heads, suggestive of sunflowers (*Helianthus*).

PECTIS L.

Reference: Rydberg, N. Amer. Fl. 34: 194. 1916.

Low, strong-scented, annual or perennial herbs, usually glabrous or nearly so; leaves opposite, narrow, gland-dotted, generally entire, commonly with bristles on the margins near the base; heads small, solitary or cymose, radiate, yellow; involucre cylindric to turbinate, the phyllaries 3–12, uniseriate, gland-dotted; receptacle naked; achenes linear, terete or angulate, pubescent or glabrate; pappus of few or many squamellae, awns, or bristles.—Several other species have been collected in Central America.

Pectis capillipes (Benth.) Hemsl. Reported from Guanacaste by Klatt. Nicaragua. Perennial, the stems branched, erect, 7–12 cm. high; leaves linear, 1.5–2 cm. long; heads solitary in the forks of the branches, on slender pedicels 3–5 cm. long; involucre turbinate, the 5 phyllaries oblong, obtuse; pappus of the disk flowers of 5–6 bristles somewhat dilated at the base, and of many shorter ones. Rydberg in the *North American Flora* gives the original locality of this species as Guatemalan, but in error, for the type was collected in Nicaragua.

Pectis diffusa Hook. & Arn. was reported from the Pacific slope by Klatt, but the species is not known from Central America.

Pectis elongata HBK. *Coronillo.* In pastures or savannas, regions of San Ramón and Buenos Aires, Pacific tierra caliente. Southern Mexico to West Indies and Peru. An erect annual, 60 cm. high or less, simple or sparsely branched, almost glabrous; leaves linear, 2–6 cm. long; heads cymose-paniculate, slender-pedicellate, the involucre 5–6 mm. high; phyllaries 5, acuminate, glabrous; achenes 2–2.5 mm. long, hirsutulous or glabrate; pappus bristles 5–20.

Pectis febrifuga van Hall. Reported by Rydberg from Costa Rica, the locality not indicated. Extending to Venezuela and West Indies. An erect annual, diffusely branched, 20 cm. high or less, the stems scabrous-pubescent; leaves linear or lance-linear, 2 cm. long or less; heads solitary in the forks of the branches, the pedicels 1.5–3 cm. long; involucre 4–4.5 mm. long, the 5 phyllaries acuminate or apiculate; achenes 2–2.5 mm. long; pappus in the disk flowers of 5 awned squamellae.

Pectis grandiflora Klatt, Leopoldina Bot. Beibl. 6. 1895. *P. falcata* Cufodontis, Archivio Bot. 9: 202. 1933 (Golfo Dulce, near Puerto Jiménez, *Cufodontis 177;* duplicate type in Herb. Field Mus.). Type from Hato Viejo. Collected several times in the Golfo Dulce region. Panama. Plants coarse, perennial, procumbent, the stems 1 meter long or less, glabrous or puberulent, very densely leafy; leaves linear, 2–4 cm. long; heads terminal, solitary, on peduncles 2–3 cm. long; involucre 1 cm. high, the phyllaries broad, obtuse; achenes 6 mm. long; pappus of 12–15 subulate squamellae. Differing from other local species in the very large heads.

Pectis Oerstediana Rydb. *Anisillo.* Collected at Alajuela, and doubtless elsewhere on the Pacific slope. Nicaragua. Plants erect, densely branched, 30–60 cm. high, glabrous; leaves linear, 5 cm. long or less; heads axillary and terminal; involucre 5 mm. high, the phyllaries linear, acuminate; achenes 2.5 mm. long, hispidulous; pappus of 3–5 bristles.

Pectis polyantha Rydb. Reported from Costa Rica, doubtless from the lower Pacific slope. Nicaragua. A diffuse perennial, the stems 10–20 cm. long, puberulent; leaves linear, 1–2.5 cm. long; heads solitary in the upper leaf axils, the peduncles 4–6 cm. long; involucre 7 mm. high, the 8–12 phyllaries linear; achenes 3 mm. long, pubescent; pappus of about 20 hirsutulous bristles.

Pectis prostrata Cav. Near seashore, San Lucas, Pacific coast, *J. M. Orozco 230*. Widely distributed in tropical America. A much branched annual, usually prostrate, short-pilose; leaves oblanceolate-linear, 1–3 cm. long, acute, often mucronate, setose-ciliate near the base; heads axillary and terminal, the lower solitary, the upper glomerate, sessile or nearly so; involucre 5–6 mm. long, the 5 phyllaries oblong, rounded or truncate at the apex; achenes 3–4 mm. long; squamellae of the ray flowers 2, narrowly lanceolate, with 1–3 smaller setae; squamellae of the disk flowers 5, unequal.

PIPTOCARPHA R. Br.

Shrubs, often with long, recurved branches, or subscandent, the pubescence chiefly stellate or lepidote; leaves alternate, petiolate, penninerved; heads small, discoid, densely clustered in the leaf axils, whitish, few-flowered; involucre ovoid or campanulate, the phyllaries multiseriate, imbricate, dry, the inner ones usually caducous, the outer shorter; receptacle convex, naked; achenes 10-costate, truncate; pappus setae more or less biseriate, stiff, the outer ones often shorter.—No other species are known from Central America.

Piptocarpha chontalensis Baker. *Barbudo*. *P. costaricensis* Klatt, Bull. Soc. Bot. Belg. 31: 184. 1892 (in forest, Térraba, 260 meters, *Pittier 3704*). Forests of the tierra caliente. Ranging to British Honduras. A shrub, sometimes 6 meters high and more or less scandent, the branches appressed-tomentose or glabrate; leaves coriaceous, short-petiolate, ovate to oblong, 10–16 cm. long, acute or subobtuse, somewhat oblique at the base and obtuse to subcordate, lustrous and almost glabrous above, pale beneath and densely appressed-tomentose; involucre 4–5 mm. long; heads 6-flowered. It is possible that *P. costaricensis* may be a distinct species, but I find no characters for separating it.

PIQUERIA Cav.

Reference: Robinson, Revision of the genus *Piqueria*, Proc. Amer. Acad. Sci. 42: 4. 1906.

Annual or perennial herbs, sometimes shrubs; leaves opposite or alternate, petiolate, usually serrate or dentate; heads small, white, discoid; involucre cylindric to ovoid or campanulate; phyllaries few, subequal, imbricate or almost 1-seriate; receptacle plane, naked; achenes prismatic, 5-angulate, rounded at the apex; pappus none, or a deciduous, annular disk, rarely of a few short setae.—No other species have been found in Central America.

Piqueria trinervia Cav. In forest, Meseta Central, chiefly at 1,100–1,500 meters. Extending to Mexico, and in Haiti. An erect, perennial herb, a meter high or less, branched, the stems puberulent in lines; leaves opposite, lanceolate or narrowly ovate, acuminate, acute at the base, serrate, glabrate, 3-nerved; heads 4-flowered, 3 mm. long, cymose-corymbose; phyllaries rounded at the apex. Costa Rican material has been referred incorrectly to *P. pilosa* HBK. and *P. trinervia* var. *pilosa* Kuntze. *P. trinervia* var. *luxurians* Kuntze (Rev. Gen. 1: 355. 1891; *P. luxurians* Robinson ex Volkens, Verh. Bot. Ver. Brandenb. 65: 118. 1923; type from Irazú, *Kuntze*) is a form in which the leaves are somewhat larger, 5-nerved, and rounded at the base. It has been collected several times on Volcán de Irazú.

Pluchea odorata (L.) Cass. must surely occur in Costa Rica, but I find neither specimens nor records of its occurrence.

PODACHAENIUM Benth.

Tall shrubs or small trees; leaves large, opposite, petiolate, angulate-lobate; heads small, radiate, forming large, corymbose panicles, the disk yellow, the rays white; involucre small, the phyllaries 2–3-seriate, narrow, herbaceous, the outer ones shorter; receptacle convex, the whole head becoming globose in fruit; achenes compressed, pubescent, the margin ciliate or cartilaginous-winged, the base contracted into a 2-winged stipe; pappus of 2 dilated awns at each angle, with 2 small squamellae on each side.—The genus consists of a single species.

Podachaenium eminens (Lag.) Schultz Bip. *Tora, Tora blanca.* *P. paniculatum* Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 99. 1853 (Volcán de Irazú, 2,400 meters, *Oersted;* photo. of type in Herb. Field Mus.). Frequent in hedges, thickets, or forest of the central region; Dota; descending into the upper part of the Atlantic tierra caliente; at 600–2,400 meters. Ranging to Mexico. A shrub or tree of 6 meters or less, sometimes wholly herbaceous; leaves slender-petiolate, ovate to orbicular, often 30 cm. long, sometimes entire but usually lobate or coarsely dentate, green and somewhat rough above, rather densely sordid-tomentose beneath; heads about 1 cm. broad; achenes 2 mm. long.

POLYMNIA L.

Coarse, perennial herbs, or shrubs, glabrous or variously pubescent, often viscid; leaves chiefly opposite, broad, entire to angulate or lobate, the petioles often auriculate-appendaged; heads usually large, corymbose-paniculate, yellow, radiate, the ray flowers fertile, the disk flowers sterile; involucre hemispheric or broader, the phyllaries biseriate, membranaceous or herbaceous, the outer ones sometimes large and green; receptacle plane, paleaceous; achenes glabrous, thick, obovoid; pappus none.—A few other species have been recorded from Central America.

Polymnia latisquama Blake, Journ. Wash. Acad. Sci. 16: 421. 1926. Along stream, southern slope of Volcán de Turrialba, near the Finca Volcán de Turrialba, 2,000–2,400 meters, *Standley 35340*. Collected also on Irazú, at 2,850 meters. Endemic. A coarse herb, 1.5–3 meters high, the stems glabrous or nearly so; leaves ovate or triangular-ovate, 10–20 cm. long, coarsely serrate, almost glabrous; heads solitary, long-pedunculate, about 6 cm. wide, the rays 3 cm. long; outer phyllaries 4, rounded-ovate, 18 mm. wide, glabrous; achenes 6 mm. long.

Polymnia maculata Cav. *Tora, Purca.* Frequent in thickets or forest of the Meseta Central, chiefly at 1,000–1,300 meters. Ranging to Mexico. A coarse, rough-pubescent herb, 1–1.5 meters high, usually viscid; petioles broadly dilated at the base and clasping; leaf blades deltoid to ovate-rounded, usually lobate and coarsely dentate, very rough; outer phyllaries lanceolate, villous or hirsute; heads, excluding the rays, about 1.5 cm. broad. Blake (Contr. Gray Herb. 52: 33. 1917) divides the Costa Rican material into two varieties: var. *vulgaris* Blake with hispid-pilose, sparsely glandular branches, the leaves green beneath, densely or sparsely hispid-pilosulous and hispid-pilose; and var. *adenotricha* Blake, with the branches densely stipitate-glandular and sparsely hispid-pilose, the leaves glandular-roughened and rather sparsely pubescent beneath. *Polymnia sonchifolia* Poepp. & Endl. as reported from Costa Rica by Klatt is *P. maculata* var. *vulgaris*.

POROPHYLLUM Adans.

Reference: Rydberg, N. Amer. Fl. 34: 181. 1916.

Annual or perennial herbs, rarely shrubs, usually glabrous; leaves alternate or opposite, petiolate, broad or narrow, entire, with pellucid glands, at least along the margins; heads small or medium-sized, discoid, mostly yellowish or purplish; involucre cylindric or campanulate; phyllaries 5–9, linear to obovate, 1-seriate, commonly with 2 rows of dorsal glands; receptacle naked; achenes slender, striate, usually hispidulous; pappus of numerous scabrous or hispidulous bristles.—One or two other species are found in Central America.

Porophyllum punctatum (Mill.) Blake. Thickets of the plains of Guanacaste. Extending to Mexico. Plants much branched, perhaps sometimes suffrutescent; leaves oval or elliptic, 1.5–3.5 cm. long; involucre 1–1.5 cm. high; corollas cream-colored; achenes 6 mm. long.

Porophyllum ruderale (Jacq.) Cass. *P. ellipticum* Cass. Occasional in thickets or fields of the tierra caliente. Widely distributed in tropical America. An erect, sparsely branched annual; leaves elliptic, 1–6 cm. long, obtuse; involucre 2 cm. high; achenes 8 mm. long.

PSEUDELEPHANTOPUS Rohr

Erect, branched, perennial herbs with leafy stems; leaves alternate, entire or crenate; heads small, 4-flowered, white or lavender, discoid, glomerate and disposed in panicled spikes, each glomerule subtended by 2–3 bracts; involucre of 4 pairs of phyllaries; achenes compressed, 10-striate; pappus a single series of 5–15 setae, the 2 lateral setae longer than the others and contorted at the tip.—A single species is found in North America.

Pseudelephantopus spicatus (Juss.) Rohr. *Escobilla, Escoba real, Lechuguilla. Elephantopus spicatus* Juss.; *Distreptus spicatus* Cass. *Elephantopus spicatus* var. *roseus* Klatt, Bull. Soc. Bot. Belg. 35: 279. 1896 (pastures, San José, *Pittier 7237*). A common weed in waste or cultivated ground, often in pastures, Meseta Central to the coasts. Generally distributed in tropical America. Plants usually a meter high or less, the branches pilose with long, appressed, whitish hairs; leaves spatulate to obovate, 6–15 cm. long, the upper ones almost linear and much smaller; involucres 8–12 mm. long, the phyllaries lanceolate, aristate-acuminate, with whitish margins. One of the most common weeds found in Central America. Pittier reports the Térraba name as Tshicordias, evidently a corruption of Achicoria.

RENSONIA Blake

Shrubs, erect or ascending, sometimes more or less scandent, rarely epiphytic; leaves opposite, ovate, slender-petiolate, serrate, scabrous; heads small, yellow, radiate, in terminal, cymose panicles; phyllaries 8–9, oblong-obovate, indurate below, thick-herbaceous above; receptacle flat, paleaceous; achenes of the fertile flowers obovate, obcompressed, epappose, 2-winged, the wings prolonged above the achene into 2 triangular, lacerate teeth.—The genus consists of a single species.

Rensonia salvadorica Blake. In thickets or forest, mountains of Guanacaste, 600–700 meters. Salvador. A slender shrub of 1–5 meters, the branches strigillose; leaf blades 10–25 cm. long, acuminate, acutely cuneate at the base; heads 6–7 mm. high, the phyllaries acute, 3–5-nerved; achenes 5.5 mm. long, blackish, hispidulous on the outer surface. Illustrated, Journ. Wash. Acad. Sci. 17: 63. 1927.

ROLANDRA Rottb.

Erect, perennial herbs, branched; leaves alternate, entire, short-petiolate, closely and densely white-tomentose beneath; heads discoid, 1-flowered, small, forming axillary and terminal, globose clusters; involucre of 2 aristate phyllaries, the outer one larger; achenes angulate, truncate; pappus a lacerate crown.—The genus consists of a single species.

Rolandra fruticosa (L.) Kuntze. Thickets of the Atlantic tierra caliente. Widely distributed in tropical America, but in Central America known definitely only from Costa Rica and Panama. Plants a meter high or less, the branches sparsely or densely strigose; leaves oblong-lanceolate to elliptic, 5–10 cm. long, acute at each end, green above and rough; glomerules of heads about 1.5 cm. in diameter, green, the phyllary tips uncinate; corolla white.

RUMFORDIA DC.

Reference: Robinson, A revision of the genus *Rumfordia*, Proc. Amer. Acad. 44: 592. 1909.

Shrubs or tall herbs, the stems branched, often fistulose; leaves opposite, chiefly ovate or lanceolate, often connate at the base and perfoliate, serrate or denticulate; heads of medium or large size, paniculate, the rays yellowish or in age white; ray flowers pistillate and fertile, the disk flowers perfect and fertile; achenes obovoid, somewhat compressed, glabrous, without pappus; involucre biseriate, the outer phyllaries herbaceous, ovate or elliptic, spreading, the inner ones much smaller, ovate or lanceolate, paleiform, enclosing the outer achenes.—A few other species are known in northern Central America.

Rumfordia aragonensis Greenm. Proc. Amer. Acad. 40: 38. 1904. Thickets near Aragón, Turrialba, 630 meters, *Pittier 13246*. Known only from the original collection. Stems fistulose; leaves rhombic-ovate, about 12 cm. long, denticulate, glabrate above, sparsely pubescent beneath, 1-lobate or angulate near the base on each side, the petioles winged; outer phyllaries 5–6, ovate, acuminate, 1.5 cm. long, inconspicuously puberulent, the inner ones ovate, acuminate, dorsally glandular-hispidulous, 5 mm. long; rays 5 mm. long; achenes 2 mm. long.

Rumfordia polymnioides Greenm. Proc. Amer. Acad. 39: 99. 1903. In maize fields, Copey, Prov. San José, 1,800 meters, *Tonduz 11947*. Collected also at Santa María de Dota in the same region. A coarse herb 1–1.5 meters high, the stems whitish-pubescent; leaves broadly ovate, acuminate, 3-nerved, green above and short-pubescent, paler beneath and griseous-tomentulose, narrowed to the winged petiole; outer phyllaries 5, broadly ovate, acute, griseous-hirsute, the inner ones linear, hispidulous.

SALMEA DC.

Reference: Blake, Journ. Bot. 53: 196. 1915.

Shrubs or woody vines, the stems terete or nearly so; leaves opposite, petiolate, more or less coriaceous and dentate; heads small, dirty white, discoid, in small, terminal and axillary corymbs; involucre campanulate or turbinate, the phyllaries appressed, imbricate in few series; receptacle conic, paleaceous; achenes laterally compressed, marginate or narrowly winged; pappus of 2 awns.—No other species are known from Central America.

Salmea scandens (L.) DC. In thickets, region of San José, descending to the Pacific coast. Widely distributed in tropical America. A scandent shrub, sometimes 10 meters long; leaves ovate to oblong-ovate, 5–12 cm. long, remotely serrate or almost entire, acute to acuminate, lustrous, almost glabrous; heads 4.5–7 mm. high, the phyllaries ovate or ovate-lanceolate, acute or acuminate. This shrub is rather well known in Salvador, where it is called "duerme-boca." It is said that if the root is chewed, it deadens sensation in the tongue. In Puerto Rico the plant is called "bejuco de muela," presumably because it is chewed as a remedy for toothache. In addition, it receives in Salvador the name "salta-afuera," an allusion to its use as a barbasco or fish poison, as which it is said to be unusually efficient. These properties well deserve scientific investigation, since they might possibly have some economic application.

SCHISTOCARPHA Less.

Reference: Rydberg, N. Amer. Fl. 34: 303. 1927.

Coarse, annual or perennial herbs; leaves opposite, petiolate, broad, thin, dentate, usually decurrent into the petiole, the petioles generally connate-amplexicaul at the base; heads radiate, rather small, cymose-paniculate; involucre campanulate, the phyllaries 3–4-seriate, imbricate, the outer shorter, striate, membranaceous; receptacle convex, paleaceous; ray flowers pistillate, the disk flowers perfect; achenes oblong, glabrous, striate or smooth, black, lustrous; pappus bristles about 20, uniseriate, caducous.—Two or three other species are recorded for Central America. In general appearance the plants resemble the genus *Eupatorium*, which is not at all closely related, but they are distinguished easily enough in the growing state by their yellow heads.

Schistocarpha bicolor Less. is reported by Cufodontis from the Atlantic coast, on the basis of too mature specimens. Probably the record is referable rather to *S. oppositifolia.*

Schistocarpha oppositifolia (Kuntze) Rydb. *S. Hoffmannii* Kuntze. Frequent in thickets or cutover land of the Atlantic tierra caliente, ascending sometimes in the central mountains to 2,400 meters; Atlantic slope of the mountains of Guanacaste. Mexico to Bolivia. A coarse herb, 1–1.5 meters high, branched, short-hirsute; leaves long-petiolate, broadly ovate, 10–20 cm. long, acuminate, abruptly contracted and cuneate-decurrent at the base, dentate, sparsely hirsutulous; heads 6–9 mm. high, in small or large panicles; phyllaries obtuse or subacute, ciliolate; rays none or minute and inconspicuous; achenes 1.5 mm. long, glabrous. A weedy plant, abundant in many parts of the Central American tierra caliente.

Schistocarpha paniculata Klatt, Bull. Soc. Bot. Belg. 31: 210. 1892. Southeastern slope of Volcán de Irazú, *Pittier 866.* Occasional in thickets or forest of the upper part of the Atlantic tierra caliente, and ascending the slopes of the central mountains to about 2,800 meters; El General. Ranging to Colombia. A shrub of 2–4.5 meters, the branches hirsute and viscid; leaves ovate or ovate-deltoid, acuminate, dentate, pilose; involucre 7 mm. high or more, the phyllaries hirsute; rays conspicuous, 6–8 mm. long; achenes glabrous.

SCLEROCARPUS Jacq.

Branched, more or less pubescent herbs; leaves chiefly alternate, the lowest sometimes opposite; heads rather large, yellow, radiate, mostly solitary and terminal or opposite the leaves; involucre campanulate, the phyllaries few, about 2-seriate, usually herbaceous; receptacle convex or conic, paleaceous; ray flowers neutral, the disk flowers perfect; achenes smooth, deciduous with the enveloping palea, the pappus none or a short crown.—One or two other species may occur in Central America.

Sclerocarpus divaricatus (Benth.) Benth. & Hook. Fields and waste ground about San José, descending into the upper part of the Pacific tierra caliente; region of San Ramón. Mexico and Central America. Plants rather slender, erect to prostrate, rarely a meter high, rough-pubescent, branched; leaves slender-petiolate, mostly 6 cm. long or less, rhombic-ovate or deltoid-ovate, acuminate, abruptly decurrent at the base, coarsely serrate; phyllaries green, the outer ones foliaceous, about 7 mm. long; disk corollas 1 cm. long or more, very slender; rays broad and conspicuous. The proper specific name for this plant is doubtful, to the writer at least, and the whole genus seems to be in a chaotic condition. So far as I know, there is available no treatment that brings order out of the apparent chaos exhibited by the usual herbarium material.

SENECIO L.

Herbs, shrubs, or small trees, sometimes epiphytic; leaves alternate, very variable in form; heads mostly yellow, sometimes whitish or orange, radiate or discoid; involucre cylindric to campanulate, the principal phyllaries narrow and uniseriate, usually with a few much smaller ones at their base; ray flowers, when present, fertile; achenes subterete, usually costate, glabrous or pubescent; pappus of numerous, soft, white bristles.—The largest genus of the Compositae, with other species in Central America, although, in general, the group is rather sparsely represented in this region. It is usually regarded as the largest of all genera of the phanerogams. For assistance in preparing the account of this genus the writer is greatly indebted to Dr. J. M. Greenman, who has suggested corrections in the manuscript, and has supplied descriptions of three new species.

Senecio andicola Turcz. Paramos of Cerro de Las Vueltas and Cerro de La Muerte, about 3,000 meters. Colombia. A densely branched shrub of 1–4.5 meters, the young branches lanate-tomentose, soon glabrate; leaves almost sessile, oblong or narrowly elliptic-oblong, 3–4.5 cm. long, acute or obtuse, acute at the base, entire, glabrous above and lustrous, ochraceous-tomentose beneath, coriaceous; heads few, discoid, corymbose at the apices of the branches; involucre campanulate, 8 mm. high; principal phyllaries 8, oblong-ovate, broadly marginate, sparsely tomentulose or glabrate; achenes glabrous. Collections cited by Klatt under the name of *S. ledifolius* DC., a South American species, are referable here, according to information supplied by Dr. Greenman.

Senecio Brenesii Greenm. & Standl., sp. nov.—Frutex epiphyticus scandens vel dependens, ramis stramineis vel ochraceis saltem in sicco angulatis, novellis sat dense lanato-tomentosis, internodiis foliis duplo vel triplo brevioribus; folia inter minora petiolata subrigide coriacea, petiolo crasso 1–1.5 cm. longo tomentoso vel glabrato; lamina elliptica vel ovato-elliptica 6–8 cm. longa 2.5–4 cm. lata obtusa vel breviter acutata, basi obtusa vel subacuta, margine vulgo plus minusve revoluto, supra glabra vel tantum ad costam impressam sparse tomentosa, evenosa, subtus ubique tomento laxo brunnescente induta, costa saliente, nervis venisque occultis; capitula discoidea pauciflora thyrsoideo-paniculata, paniculis terminalibus atque axillaribus usque 10 cm. longis, basi interdum foliis paucis reductis bracteatis, capitulis breviter pedicellatis vel subsessilibus dense aggregatis; involucrum ca. 8 mm. longum, phyllariis principalibus vulgo 8 dorso laxe tomentosis vel glabratis obtusis linearibus apice subinflexis; achaenia glabra.—In forest, La Palma de San Ramón, 1,100 meters, January, 1927, *Brenes 5342* (type in Herb. Field Mus.); February, 1927, *Brenes 5406*. Among Costa Rican species this is easily recognized by the dense tomentum of the lower surface of the entire leaves.

Senecio calyculatus Greenm. in Donn. Smith, Bot. Gaz. 37: 419. 1904. Volcán de Turrialba, 2,700 meters, *Pittier 7503* (*13242*). Upper slopes of Turrialba and Irazú, ascending to at least 2,700 meters. Endemic. An epiphytic shrub, the branches pendent, about a meter long, tomentose at first, soon glabrate; leaves slender-petiolate, elliptic-lanceolate to elliptic-obovate, mostly 3–6 cm. long, obtuse or acute, acute at the base, coriaceous, entire; inflorescence covered with a dense, white tomentum; heads discoid, yellow, 8–9 mm. high, very numerous and densely crowded, sessile; phyllaries 8; achenes glabrous. This species is easy of recognition because of the combination of entire, glabrous leaves and densely white-tomentose inflorescence.

Senecio candelariae Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 108. 1853. *Vara blanca.* Candelaria, at 1,800 meters, *Oersted.* Frequent in forest of the central region, ascending on Poás to 2,600 meters, but chiefly at 1,000–2,000 meters; region of San Ramón. Endemic. An epiphytic shrub, usually about a meter long, almost glabrous except in the inflorescence and there sordid-puberulent or sparsely tomentulose; leaves petiolate, lanceolate or lance-oblong to elliptic, mostly less than 10 cm. long, acuminate, acute or obtuse at the base, subcoriaceous, entire, the lateral nerves inconspicuous or obsolete; heads discoid, whitish, on short or elongate pedicels, forming a compact or rather lax, corymbiform inflorescence; involucre 4–6 mm. high, the phyllaries usually 8, glabrate; achenes glabrous. One sheet referred here for the present has been indicated by Greenman as a new species, still unpublished. The rather numerous sheets at hand exhibit considerable variation, and it is possible that they represent as many as three species, although I am inclined to believe that all are forms of a single variable entity. I have not seen type material of *S. candelariae,* and am uncertain as to which of the variations is nearest the type.

Senecio Cineraria DC. Sometimes grown for ornament in gardens of the central region. Native of the Old World. A low perennial, very densely white-tomentose throughout; leaves deeply pinnatifid, the numerous divisions narrow, obtuse; heads yellow, radiate, in small, dense cymes. The plant is called "dusty miller" in the United States.

Senecio Cooperi Greenm. Field Mus. Bot. 2: 284. 1907. Cartago, 1,310 meters, *Cooper 5803.* Slopes of Irazú and Poás, ascending to at least 1,800 meters; El General. Also in Chiriquí, Panama. A rather succulent herb, or sometimes suffrutescent, as much as 4 meters high, simple or branched, the stems and inflorescence abundantly brownish-hirtellous, densely leafy; leaves very large, oblong-ovate, 50 cm. long or less, obtuse to acuminate, often lyrate-pinnatifid toward the base, irregularly dentate, puberulent or sparsely tomentulose on both surfaces or glabrate, petiolate, the petiole naked or winged to the base; heads very numerous, forming a large, corymbiform panicle; heads radiate, yellow, 1.5 cm. high; phyllaries 8, linear, glabrous except at the apex; achenes pubescent.

Senecio copeyensis Greenm. Field Mus. Bot. 2: 285. 1907. Forests of Copey, 1,800 meters, *Tonduz 11663.* Collected also at Agua Caliente, 1,600 meters, and probably also on Irazú and Poás.

Endemic. A shrub or small tree, about 4.5 meters high, sparsely branched, the branches stout, tomentose; leaves large, on naked petioles, 20–30 cm. long or more, oblong-ovate or ovate, pinnate-lobate, acute at the base, tomentulose beneath at first but soon glabrate, the lobes broad or narrow, acute; heads yellow, very numerous, forming dense and broad, tomentose, corymbose panicles; phyllaries usually 8, only 4–5 mm. long; achenes glabrous. Costa Rican material that has been referred to *S. arborescens* Steetz, a species of Mexico and northern Central America, is presumably referable here.

Senecio Durandii Klatt, Bull. Soc. Bot. Belg. 31: 211. 1892. Río de Las Vueltas, 2,100 meters, *Pittier 220.* Forests of Rancho Flores; slopes of Volcán de Barba; Cerro Gallito; at 2,000–2,400 meters. Endemic. A slender, glabrous herb, or often somewhat woody below, erect or decumbent, 30–60 cm. high, the stems dark purple-red; leaves dark green, linear-lanceolate, herbaceous, 10 cm. long or less, 1–1.5 cm. wide, narrowly long-attenuate, attenuate to the slender petiole, sharply and conspicuously serrate; heads few, terminal, subcorymbose or cymose, long-pedicellate, the pedicels with numerous linear bracts; involucre 1 cm. long, the linear phyllaries about 13, scarious-marginate; rays large, orange-yellow. I have no doubt that I have determined correctly the material placed here, although Klatt describes the achenes as pilose, while in the collections now referred here they are glabrous. The species is a most distinct one, altogether unlike any other with which I am familiar. Although referred by Greenman to his section *Streptothamni,* it certainly has little if anything in common with other species grouped in that section. Where I have seen the plant, which appears to be rare, it grew on rocks at the edge of streams in deep, dark forests, sometimes in the spray of waterfalls. The crushed leaves have the peculiar odor of *Eryngium foetidum.*

Senecio firmipes Greenm. Proc. Amer. Acad. 39: 119. 1903. Cerro de La Muerte, 3,100 meters, *Pittier 10472.* Also on Cerro de Las Vueltas, at about the same elevation. Endemic; growing in wet thickets at the edge of the paramos. A dense, heathlike shrub, 2–4.5 meters high, the branches glabrous; leaves lanceolate, 2–3 cm. long, 4–6 mm. wide, acute, somewhat pungent-tipped, slightly hirtellous on the margins, narrowed to the base, glabrous, somewhat glaucous beneath; heads discoid, 5–6 mm. high, forming terminal, corymbiform cymes; phyllaries 8, oblong-ovate, glabrous, thick, obtuse; achenes glabrous.

Senecio heterogamus (Benth.) Hemsl. Biol. Centr. Amer. Bot. 2: 242. 1881. *Cacalia heterogama* Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 107. 1853. Southern slope of Volcán de Irazú, 2,400 meters, *Oersted 8858* (photo. of type in Herb. Field Mus.). In forest, slopes of Irazú and Cerro de Las Vueltas, 2,400–3,000 meters. Chiriquí, Panama; a variety is described from Guatemala. Plants herbaceous or suffrutescent, 1–1.5 meters high, rather copiously scabrous-pubescent; leaves long-petiolate, peltate, ovate-rounded, large, angulate-lobate; heads discoid, pale yellow, the involucre 8 mm. long; phyllaries about 12; achenes glabrous. This differs from all other Costa Rican species in its peltate leaves, but other species with peltate leaves are found in other parts of Central America.

Senecio Hoffmannii Klatt, Leopoldina 25: 106. 1889. *San Rafael. S. Berlandieri* Auct. San José, *Hoffmann 497.* Common in thickets of the Meseta Central, descending to the coasts, at 1,500 meters or less; region of San Ramón; Guanacaste. Panama. A rather coarse, terrestrial vine, herbaceous or suffrutescent, with sparse, rough pubescence; leaves petiolate, ovate to lance-oblong, acuminate, obtuse to subcordate at the base, coarsely or finely dentate, somewhat succulent; heads few, large, long-pedunculate, subcymose at the ends of the branches; involucre about 1 cm. long, the linear phyllaries about 20, puberulent and somewhat tomentulose; flowers all orange or sometimes dark red, the rays numerous and conspicuous; achenes puberulent. The plant is a rather handsome and showy one, plentiful in many places about San José, often growing over hedges. It is easily recognized by its scandent habit, other scandent Senecios of Costa Rica being small, epiphytic vines. The flowers are much visited by bees, and the vine is said to be a prolific source of honey.

Senecio megaphyllus Greenm. Field Mus. Bot. 2: 284. 1907. *S. multivenius* var. *oliganthus* Greenm. loc. cit. in syn. "Bords du Paraita Grande," Copey, 1,800 meters, *Tonduz 11700.* Wet forest, La Hondura de San José, and slopes of Volcán de Barba, 1,200–2,000 meters. Endemic. Plants herbaceous or somewhat frutescent, 1.5–3 meters high, simple or branched, the stout stems arachnoid-tomentose above; leaves large, oblong-obovate, often 50 cm. long, acute or acuminate, coarsely dentate, narrowed below to the petiole and decurrent upon it to its amplexicaul base, somewhat arachnoid-tomentose or soon glabrate; heads numerous, bright yellow, radiate, forming a dense, corymbose panicle; phyllaries 8, linear, 1 cm. long, glabrous; achenes glabrous. A showy and handsome plant, like other related species.

Senecio mirus Klatt, Bull. Soc. Bot. Belg. 31: 213. 1892. La División, Valle de El General, 2,160 meters, *Pittier 3405.* Apparently known only from the original locality. Plants herbaceous, the stem purple, glabrous, winged; lower leaves petiolate, large, cordate, serrate, violaceous beneath, pilose on the costa, pinnate-lobate below, the petiole dilated at the base, the upper leaves entire, adnate-decurrent; heads terminal, radiate, long-pedicellate, laxly corymbose, the pedicels bearing numerous filiform bracts; phyllaries 21, lanceolate, barbate at the apex; achenes glabrous. I have seen no representation of this species.

Senecio multivenius Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 109. 1853. *Quiebrahacha* (Copey), *Tabaquillo.* Southern slope of Volcán de Irazú, 2,400 meters, *Oersted.* Frequent in forest or in clearings, slopes of the mountains of the central region, and in the region of Dota, 2,000–3,000 meters. Endemic. A simple or branched herb or shrub, 1–4.5 meters high, almost glabrous or when young laxly and sparsely tomentulose; leaves ovate or lanceolate, often 40 cm. long, coarsely dentate and usually more or less pinnate-lobate but shallowly so; petioles long and slender, naked; heads very numerous, bright yellow, radiate, forming a large, dense, corymbose panicle; involucre 6 mm. long, the 8 phyllaries linear; achenes glabrous.

Senecio Oerstedianus Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 109. 1853. *Papelillo.* Crater of Reventado, Volcán de Irazú, 2,700 meters, *Oersted.* Forests and pastures of the upper slopes of Irazú and Turrialba, 2,700–3,450 meters; Cerro de La Muerte. Endemic. A stout herb, 1–2 meters high, densely white-tomentose almost throughout, glabrate only on the upper leaf surface; lower leaves petiolate, ovate, the upper ones sessile and amplexicaul, large, rounded to acuminate, closely and rather coarsely dentate, the lowest ones usually cordate at the base; heads numerous, bright yellow, radiate, forming a large, dense, corymbose panicle; involucre 7 mm. long, the phyllaries about 20, linear, densely white-lanate; achenes glabrous.

Senecio phanerandrus Cufodontis, Archivio Bot. 9: 203. 1933. Volcán Poás, 2,400 meters, *Cufodontis 544.* Upper slopes of Poás, 2,400–2,600 meters. Endemic. A scandent shrub, almost glabrous; leaves petiolate, subcoriaceous, ovate-elliptic, 5 cm. long or less, obtuse or acute, truncate to acute at the base, obtusely crenate-dentate; heads discoid, small, very numerous, forming a somewhat leafy, rather thyrsiform panicle; phyllaries 8, linear, 5 mm. long, glabrous except at the apex; achenes glabrous. A very distinct species, apparently local in distribution. A portion of the type material has been forwarded through the courtesy of the author of the species. To this are referred for the present *Standley & Valerio 50544* from Cerros de Zurquí and *Manuel Valerio 1098* from Cerro Gallito. In inflorescence characters they seem to be exactly like *S. phanerandrus,* and on the stems there are traces of the curious tuberculate-scabrous indument that characterizes *S. phanerandrus.* However, their leaves are narrower and less evidently dentate. It may be that they represent a distinct species, but this can be decided only when more ample material is available for comparison.

Senecio schizotrichus Greenm., sp. nov.—Frutex scandens ubique cum pilis albo-ramosis obtectis; caulibus ramisque subangulatis, striatis; foliis alternis, petiolatis, elliptico-lanceolatis, 3.5–8.5 cm. longis, 1.5–4.5 cm. latis, acutis, integris, basi obtusis, supra viridibus, subtus pallidioribus et prominenter venosis, utrinque pubescentibus; petiolis 10–12 mm. longis; inflorescentiis terminalibus paniculatis, inflorescentiae bracteis plus minusve foliaceis; capitulis numerosis, homogamis; involucris anguste campanulatis, brevius calyculatis, paulo pubescentibus; involucri squamis 8, lineari-lanceolatis, 7–8 mm. longis; floribus tubularibus vel tubuloso-campanulatis, flavis, exterioribus paululo minoribus; achaeniis glabris.—Vicinity of El General, Province of San José, alt. 975 meters, Jan., 1936, *Alexander F. Skutch 2502* (type in Mo. Bot. Gard. herb.). This species is well marked and easily distinguished from all known species of the genus by the white, branched hairs on all vegetative parts of the plant.

Senecio streptothamnus Greenm., sp. nov.—Frutex scandens; caule tereti in sicco cortice cinereo-brunneo tecto; foliis alternis, petiolatis, elliptico-lanceolatis, acutis vel breve acuminatis acutisque, integris, utrinque glabris subtus paululo pallidioribus; inflorescentiis terminalibus, paniculato-cymosis; capitulis heterogamis, ca. 8–10 mm. altis; involucris campanulatis, paulo calyculatis; involucri bracteis plerumque 8, lineari-lanceolatis, acutis, 5–6 mm. longis, glabris; floribus femineis 3–5, ligulis anguste lineari-oblongis; floribus disci 8–10; achaeniis glabris vel in angulis minute hirtellis.—Forests of Las Vueltas, Tucurrique, alt. 635–700 meters, March, 1889, *Adolfo Tonduz 13275* (Gray Herb., type).

Senecio Tonduzii Greenm. Bot. Jahrb. 32: 22. 1901, nomen.—Frutex scandens; caulibus lignosis vel juventate aliquanto carnosis, glabris; foliis alternis, brevipetiolatis, ellipticis vel ovatis, 6–14 cm. longis, 3.5–6 cm. latis ad apicem acutis vel subrotundatis, integris vel leviter sinuato-denticulatis, utrinque glabris, inconspicue venosis, basi in petiolum usque ad 1 cm. longum angustatis; foliis superioribus fere sessilibus; inflorescentiis paniculatis, inflorescentiae bracteis subfoliaceis; involucris anguste campanulatis, breve calyculatis; capitulis heterogamis, radiatis; involucri squamis plerumque 8, lanceolatis, 6–7 mm. longis, glabris; floribus ligulatis 5–8, ligulis anguste oblongis, 3–4 mm. longis, flavis; floribus disci 12–15; pappi setis albidis; achaeniis glabris.—Costa Rica, "sur les troncs d'arbres des paturâges de La Palma," alt. 1,460 meters, August, 1898, *Adolfo Tonduz 12542* (U. S. Nat. Herb., type; Gray Herb., Kew Herb., Berlin Herb., British Mus. Herb.). Cascajal, in 1920, *C. H. Lankester K146* (Kew Herb.).

SIGESBECKIA L.

Annual herbs, erect or ascending, branched, viscid-pubescent; leaves broad, opposite, dentate; heads small, subradiate, yellow, the flowers few, the ray flowers pistillate, fertile, the disk flowers perfect, fertile; phyllaries few, herbaceous, glandular, the outer ones usually 5, linear-cuneate, spreading, the inner small, erect, concave; achenes glabrous, obovoid-oblong, turgid, usually incurved, obtuse, without pappus.—Probably a single species is native in North America.

Sigesbeckia jorullensis HBK. *Mielilla.* In forest or thickets, Meseta Central and region of Dota, ascending high on the slopes of the mountains, at 1,100–3,000 meters. Mexico to Panama, and perhaps extending farther southward. A coarse annual, a meter high or less, usually rather freely branched, very viscid-pubescent, the stems usually dark red; leaves thin, ovate to lance-ovate, often cordate at the base, acute or acuminate, coarsely serrate, the long petioles broadly winged, broadly dilated at the base and amplexicaul; heads very numerous, 5–7 mm. broad, the outer phyllaries conspicuous, often greatly elongate. An inconspicuous, weedy plant of unattractive appearance. The very viscid flower heads adhere in an annoying fashion to clothing.

SIMSIA Pers.

Reference: Blake, Proc. Amer. Acad. 49: 376. 1913.

Coarse, annual or perennial herbs; leaves alternate, or the lower usually opposite; heads rather large, radiate or discoid, the flowers

yellow or purple; phyllaries 3–4-seriate, subequal or slightly graduated, narrow; receptacle slightly convex, paleaceous; rays usually yellow; disk achenes flat, obovate or oblong, glabrous or sericeous, the edges thin, not marginate; pappus none or of 2 awns.—A few other species are found in Central America.

Simsia grandiflora Benth. Thickets of the Pacific coast; region of Nicoya. Nicaragua to Panama, and perhaps ranging even more widely. A coarse annual, a meter high or often much taller, branched, viscid-pilose; lower leaves broadly ovate, acute, truncate at the base, crenate or serrate, glandular-puberulent and setose, long-petiolate, the upper leaves sessile or nearly so; heads few, axillary and terminal, the disk 2–3 cm. broad; phyllaries lance-ovate to ovate-oblong, subacute, glandular-hispid; rays about 1 cm. long; achenes 5–6 mm. long. In some regions of the Pacific coast of Central America this plant is a common weed in cultivated fields.

SONCHUS L.

Annual or perennial herbs with milky sap, somewhat succulent; leaves alternate, auriculate-amplexicaul and sessile, entire to dentate or pinnatifid, prickly-margined; heads medium-sized, corymbose or paniculate, yellow, the flowers all with liguliform corollas; involucre ovoid or campanulate, the phyllaries herbaceous, imbricate in several series, the outer shorter; receptacle flat, naked; achenes oval to linear, compressed, costate, truncate; pappus of numerous soft, white, capillary bristles.—No other species are known from Central America, and none are native in North America.

Sonchus oleraceus L. *Lechuguilla, Serraja, Serrajilla.* Frequent in waste or cultivated ground, especially about dwellings, Meseta Central and elsewhere, ascending to 2,400 meters. Native of the Old World, but abundantly naturalized in temperate and tropical America. An annual, commonly about 60 cm. high, simple or sparsely branched; basal and lower cauline leaves lyrate-pinnatifid, the terminal segment usually larger and deltoid; heads pale yellow, 2–3 cm. broad.

SPILANTHES Jacq.

Reference: A. H. Moore, Revision of the genus *Spilanthes*, Proc. Amer. Acad. 42: 521. 1907.

Annual or perennial herbs, erect to prostrate; leaves opposite, sessile or petiolate; heads small, discoid or radiate, yellow or white, the rays usually small; phyllaries few or numerous, obtuse or acute, ovate or lanceolate; achenes compressed, the margin ciliate or naked; pappus none or of 2 short awns.—A few other species are recorded from Central America.

Spilanthes americana (Mutis) Hieron. *Calabaza.* *S. Mutisii* HBK. *S. parvifolia* Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 100. 1853 (Santa Rosa, Guanacaste, *Oersted*). Moist banks or fields, Meseta Central to the Pacific coast. Widely distributed in tropical America. Plants slender, prostrate or procumbent, rooting at the nodes, somewhat pubescent or glabrate; leaves ovate or ovate-lanceolate, mostly 3 cm. long or less, serrate or subentire, obtuse or acute; heads radiate, the disk about 7 mm. broad, the rays short but conspicuous, yellow. Moore reported for Costa Rica *S. americana* var. *parvula* (Robinson) Moore and *S. americana* var. *parvula* f. *parvifolia* (Benth.) Moore (based on *S. parvifolia* Benth.), both of which seem to be forms of no particular systematic importance. The plants often form dense carpets of yellow along country roads.

Spilanthes macrophylla Greenm. Proc. Amer. Acad. 39: 109. 1903. Río del Volcán, *Pittier 3717*. Alto del Zacatal; San Marcos; along streams, region of San Ramón. Honduras to Panama. Plants much larger than in the other species, apparently usually a meter high or more and said to reach almost 2 meters, the stems sparsely hirsute; leaves ovate-lanceolate, 5–15 cm. long, acute or acuminate, entire or serrate, short-petiolate, glabrous or sparsely hirsute beneath; heads radiate, yellow, 8–10 mm. high, axillary and terminal; phyllaries biseriate, acute, 4–7 mm. long.

Spilanthes ocymifolia (Lam.) A. H. Moore. Frequent in moist fields and waste ground, Meseta Central to the Pacific tierra caliente; region of Dota; Guanacaste; region of San Ramón. Widely distributed in tropical America. Plants usually erect, 60 cm. high or less, pubescent or glabrate; leaves ovate, dentate or subentire; heads whitish, discoid, in fruit about 1 cm. long. Easy of recognition because of the whitish, discoid heads, which very rarely have short and inconspicuous, whitish rays. Var. *acutiserrata* Moore (Proc. Amer. Acad. 42: 533. 1907; Cartago, *Cooper 5807*) is a form of slight importance with acuminate, acutely serrate leaves.

Spilanthes poliolepidica A. H. Moore, Proc. Amer. Acad. 42: 540. 1907. Chilamate, near Río Sarapiquí, *Biolley 7420*. Honduras. Plants grayish-pilose; leaves lanceolate, 3–5 cm. long, short-petiolate or almost sessile, entire or nearly so; heads yellow, 6–8 mm. long, radiate; phyllaries pilosulous; achenes ciliate.

Spilanthes uliginosa Swartz is reported from Costa Rica by Klatt and may occur here, since it is found in Panama. The specimens cited by Klatt do not seem to be mentioned by Moore in his account of the genus, and their proper specific position must remain uncertain until they are re-examined.

STEVIA Cav.

Reference: Robinson, Observations on the genus *Stevia*, Contr. Gray Herb. 90: 36. 1930; The Stevias of North America, op. cit. 90. 1930.

Shrubs or herbs, often viscid; leaves chiefly opposite, petiolate or sessile, dentate or entire; heads small, discoid, few-flowered (chiefly 5–8-flowered), corymbose-paniculate; phyllaries 5–8, subequal, rather rigid, narrow, subherbaceous; corolla white, pink, or purple; achenes slender, commonly 5-costate, glabrous or hispidulous; pappus of 2–12 short squamellae or slender awns, or of both.—Other species are known from Central America. The genus is much more abundantly represented farther north, especially in Mexico, and in the South American Andes.

Stevia elatior HBK. Las Cóncavas, south of Cartago, *Lankester 266*. Mexico to Venezuela and Ecuador. An erect perennial, about 60 cm. high, the abundant pubescence of spreading, gland-tipped hairs, the stems usually simple; leaves broadly deltoid-ovate to ovate-oblong, obtuse, crenate-serrate, coarsely pubescent on both surfaces; heads about 1 cm. long, long-pedicellate, forming a lax, open panicle; phyllaries acute, glandular-pubescent.

Stevia elongata HBK. Reported from Heredia and the region of San José. Mexico to Venezuela. An erect perennial, the stems glandular-puberulent; leaves ovate or rhombic-ovate to lance-oblong, the upper sessile, the middle and lower ones petiolate, acuminate to rounded, narrowed to the base, serrate or crenate, pubescent chiefly on the nerves and veins; heads 9–11 mm. long, sessile or nearly so, in dense, paniculate glomerules; phyllaries oblong or lanceolate, acute, glandular-pubescent; corollas pale pink or lilac. The Costa Rican material is referred by Robinson to var. *caracasana* (DC.) Robinson. The species seems to be none too well differentiated from *S. rhombifolia*, and so far as Costa Rican material is concerned, I rather doubt that there is any constant difference.

Stevia lucida Lag. *S. nitida* Walp. Reported by Robinson from Volcán de Irazú, at 2,300 meters. Mexico to Venezuela. A glutinous shrub a meter high or less; leaves slender-petiolate, ovate-oblong or lance-oblong, crenate-serrate or dentate, acuminate or acute, glabrous, 4–7 cm. long; heads 1 cm. long, sessile or nearly so, in dense, corymbose glomerules; phyllaries linear, acute, very viscid; corollas white or pinkish; achenes bearing a short crown of somewhat dentate, connate squamellae.

Stevia rhombifolia HBK. *S. compacta* Benth. Frequent in thickets or forest of the central region, descending into the upper part of the Pacific tierra caliente; regions of Dota and San Ramón; mostly at 800–1,300 meters. Mexico to Peru. An erect, perennial herb, a meter high or less, simple or sparsely branched, the stems puberulent; leaves ovate or rhombic-ovate to lance-oblong, mostly 3–6 cm. long, acute or acuminate, narrowed at the base, crenate-serrate, sessile or nearly so, pubescent on both surfaces; heads 6–9 mm. long, white or pale pink, sessile or nearly so, in compact glomerules arranged in a convex panicle; phyllaries narrowly oblong, acute, puberulent and glandular; achenes bearing a crown of short, erose squamellae. The Costa Rican material is referred by Robinson to var. *stephanocoma* Schultz Bip.

STRUCHIUM P. Br.

Somewhat succulent, erect or ascending herbs; leaves alternate, thin, petiolate, serrate; heads small, axillary, sessile, discoid, white or purplish; involucre hemispheric, the phyllaries imbricate in several series; receptacle convex; achenes 4-angulate, truncate, glabrous or minutely glandular; pappus a cartilaginous crown.—The genus consists of a single species.

Struchium sparganophorum (L.) Kuntze. *Sparganophorus Vaillantii* Crantz. Thickets or wet ground, Atlantic tierra caliente. British Honduras to Panama and West Indies; tropical Africa. Plants a meter high or less, sparsely appressed-pilose on the young parts; leaves lanceolate to elliptic, acute at each end, 5–12 cm. long, often almost entire; heads 6–9 mm. broad, densely aggregate in the leaf axils; phyllaries acuminate, scarious-marginate; achenes 1.5 mm. long.

Syncephalantha sanguinea Klatt was based upon material collected by Warscewicz in "Guatemala et Costa Rica," and it is reported from Costa Rica by Rydberg (N. Amer. Fl. 34: 160. 1915), probably upon the basis of Klatt's record. The plant is frequent in Guatemala, but has not been found recently in Costa Rica, therefore the record for the latter country probably should be deleted.

SYNEDRELLA Gaertn.

Annual herbs, erect or ascending; leaves opposite, petiolate, dentate; heads small, axillary, usually sessile and glomerate, radiate, yellow; involucre oblong, the phyllaries few, imbricate, the outer 1–2 foliaceous, the inner paleaceous; receptacle small, paleaceous; ray flowers pistillate and fertile, the disk flowers perfect; ray achenes compressed, 2-winged, the wings produced into awns, the disk achenes narrower, 2–3-aristate.—No other species are found in Central America.

Synedrella nodiflora (L.) Gaertn. Waste ground or thickets of the tierra caliente, ascending rather high on the Pacific slope. Widely distributed in tropical America. Plants appressed-pilose, erect or sometimes weak and reclining, much branched; leaves ovate or elliptic, 3–10 cm. long, triplinerved, acute, narrowed at the base to the short petiole, serrate; heads several together in dense, sessile clusters; involucre 8 mm. high, the outer phyllaries oblong-lanceolate, pubescent; achenes 4–5 mm. long, those of the ray flowers with marginal bristles and 2 short awns.

TAGETES L.

Reference: Rydberg, N. Amer. Fl. 34: 148. 1915.

Annual or perennial, strong-scented herbs; leaves opposite, or the upper alternate, commonly pinnate or pinnatifid, conspicuously gland-dotted; heads radiate, yellow or orange, pedunculate, solitary at the ends of the branches or in leafy cymes; involucre fusiform to campanulate; phyllaries 3–10, narrow, uniseriate, united almost to the apex, glandular; ray flowers pistillate, fertile, the disk flowers perfect and fertile; achenes narrow and slender, angulate or terete, glabrous or pubescent; pappus squamellae 3–10, very unequal, 1 or 2 of them much longer than the others.—A few other species occur in Central America.

Tagetes erecta L. *Flor de muerto. Marigold.* Cultivated commonly in gardens for ornament, sometimes escaping. Perhaps native of Mexico. A tall, stout, branched annual, the stems glabrous; leaves pinnate, the 11–17 leaflets lanceolate or linear-lanceolate, 1–5 cm. long, serrate; involucre 1.5–2 cm. long, glabrous, the phyllaries 5–8; disk corollas glabrous; achenes 7–8 mm. long. A well known ornamental plant, cultivated in almost all parts of the earth.

Tagetes filifolia Lag. *Anís, Manzanilla, Anisillo. T. congesta* Hook. & Arn. Frequent in fields of the central region; regions of

Dota and San Ramón. Extending to Mexico. A slender annual, erect, 20–40 cm. high, simple below, branched above, glabrous or nearly so; leaves pinnatifid or bipinnatifid into linear-filiform, short divisions; heads mostly pedicellate; involucre 7 mm. long, not angulate at the base, the phyllaries 5; ray flowers 1–3, the ligules 1.5 mm. long; disk corollas glabrous; achenes 4.5 mm. long. In domestic medicine, an infusion of the plant is employed as a diuretic.

Tagetes foetidissima DC. Region of Santa María de Dota; Guanacaste. Extending to Mexico. A glabrous, branched annual, a meter high or less; leaflets 11–29, oblong or lance-oblong, 1–2.5 cm. long; heads long-pedunculate, the involucre 1.5 cm. long, the phyllaries 5; ray flowers usually 5, the ligules 2 mm. long; disk corollas viscid-hispid; achenes hirsute, 6 mm. long.

Tagetes microglossa Benth. *Flor de muerto; Rudillo, Manzanilla. T. macroglossa* Polak. Linnaea 41: 580. 1878 (near San José, *Polakowsky 372;* photo. in Herb. Field Mus.). Common in fields and thickets of the Meseta Central, descending to the Pacific coast; regions of Dota and San Ramón. Guatemala to Ecuador. A slender, glabrous annual, a meter high or less, often densely branched; leaflets 7–11, oblanceolate, 1–2 cm. long, serrate; heads numerous, long-pedunculate, the involucre 1.5 cm. long; phyllaries 5; ray flowers 3–5, the ligules small; disk corollas glabrous; achenes 8–9 mm. long, hispidulous.

Tagetes pusilla HBK. *Flor de muerto.* Frequent in fields or thickets of the Meseta Central; region of San Ramón. Guatemala to Bolivia. Closely related to *T. filifolia,* and probably only a form of that species, if at all distinct; plants usually low and diffusely branched, about 10 cm. high; heads sessile or nearly so, the involucre conspicuously angulate at the base.

Tagetes remotiflora Kunze. *Flor de muerto.* Fields and thickets of the Meseta Central. Extending to Mexico. A glabrous annual, 70 cm. high or less; leaflets 9–25, lanceolate or linear-lanceolate, 1–3 cm. long, serrate; heads long-pedunculate, the involucre 13–14 mm. long; phyllaries usually 5; ray flowers 5, the ligules obovate, almost 1 cm. long; disk flowers puberulent.

Tagetes subulata Cervantes. In pastures, region of San Ramón, 1,050 meters. Mexico to Colombia. A slender, glabrous annual, 50 cm. high or less, usually openly branched; leaflets 5–13, 1 cm. long or less, pectinately dissected into narrow lobes; heads long-pedunculate, the involucre 1.5 cm. long, the phyllaries 4–5; ray flowers 3–5, the ligules 2 mm. long; achenes 5 mm. long.

Tagetes tenuifolia Cav., which ranges from Mexico to Colombia, has been reported from Costa Rica and may occur here, but I have seen no specimens certainly referable to it.

TARAXACUM Hall. Dandelion

Acaulescent, perennial herbs with thick roots, the sap milky; leaves all basal, forming a rosette, pinnatifid or sinuate-dentate; heads large, yellow, solitary at the ends of hollow scapes, the corollas all liguliform; inner phyllaries 1-seriate, subequal, slightly united at the base, with several series of short, spreading outer ones at the base; receptacle flat, naked; achenes oblong or linear-fusiform, 5–10-nerved, roughened above, tapering into a slender beak; pappus of numerous soft, slender bristles.—No species are native in Central America.

Taraxacum officinale Weber. *Diente de león, Amargón, Arnica.* Frequent in fields and on open banks about San José and Cartago; pastures of Volcán de Turrialba. Native of Europe, but widely adventive in North America. Leaves oblong to spatulate, pinnatifid to almost entire, sparsely pubescent when young; scapes 5–20 cm. high, the showy heads 2.5–5 cm. broad.

TESSARIA Ruiz & Pavón

Grayish-pubescent shrubs; leaves alternate, usually entire; heads small, discoid, whitish or purplish, in terminal cymes or corymbs, involucre ovoid, the phyllaries multiseriate, imbricate, scarious; graduated; receptacle plane, naked; achenes small, 4–5-angulate, glabrous or pubescent; pappus of numerous slender bristles.—A single species is found in North America.

Tessaria mucronata DC. Usually along sandy stream beds, Pacific tierra caliente and even at higher elevations on the Pacific slope, ascending to about 1,200 meters; region of San Ramón. Extending to Colombia and perhaps farther southward. A shrub of 1.5–3.5 meters, the branches sericeous or glabrate; leaves mostly oblong-oblanceolate, acute, attenuate to the base, entire, densely grayish- or brownish-sericeous on both surfaces; heads about 5 mm. long, sessile and densely aggregate, the outer phyllaries somewhat tomentose, the inner ones glabrous. The Costa Rican plant has been referred to *T. legitima* DC. The taxonomy of the genus is apparently in a chaotic condition, and the proper name for the Central American species is questionable.

TITHONIA Desf.

Reference: Blake, Revision of the genus *Tithonia*, Contr. U. S. Nat. Herb. 20: 423–436. 1921.

Tall, coarse herbs, or shrubs; leaves alternate, or the lowest opposite, petiolate, dentate or lobate; heads very large, radiate, yellow, the long peduncles fistulose; involucre broad, the phyllaries about 4-seriate, broad, graduate; rays neutral; achenes turgid; pappus of free or connate squamellae, with or without awns, or absent.—At least one other species is native in Central America.

Tithonia diversifolia (Hemsl.) Gray. *Mirasol.* Frequent in thickets or fields of the Meseta Central; region of Dota; chiefly at 1,000–1,400 meters. Ranging to Mexico. Plants herbaceous or more or less woody, usually 1.5–3 meters high, branched, the stems hispid-pilose; leaves large, ovate or deltoid-ovate, usually 3–5-lobate, cuneate at the base, the lobes acuminate to attenuate, tuberculate-hispidulous above, soft-pilose beneath; disk of the head 1.5–4 cm. broad; phyllaries broadly oval or oval-ovate, rounded at the apex, sparsely pilose or almost glabrous; rays 6 cm. long or less; pappus of 2 awns and 6–10 squamellae. In many regions this is a common weed of cornfields. The Costa Rican plant was referred by Klatt in error to *T. speciosa* Hook.

Tithonia longeradiata (Bertol.) Blake. *T. scaberrima* Benth. Río Tilirí, near San José. Ranging to southern Mexico. A stout, coarse herb, sometimes 5 meters high, the stems densely pilose or hispid-pilose; leaves ovate-lanceolate to broadly ovate, acuminate, narrowed to the petiole, crenate-serrate, scabrous above, densely pilose beneath; disk 1.5–3.5 cm. broad; phyllaries 4-seriate, oval or obovate, broadly rounded at the apex, hispid-pilose or glabrate; achenes glabrous; pappus none.

Tithonia Pittieri (Greenm.) Blake, Contr. Gray Herb. 54: 9. 1918. *Gymnolomia Pittieri* Greenm. Proc. Amer. Acad. 39: 101. 1903. Río Ceiba, Buenos Aires, *Pittier 3735.* Regions of Buenos Aires and San José, at 1,200 meters or less. Ranging to Guatemala. Plants tall, herbaceous, the stems hispid-pilose; leaves lanceolate, acuminate, tapering to the short petiole, crenate-serrulate, hispidulous above, pilosulous beneath; disk 1–2 cm. broad; phyllaries 4-seriate, the outermost oblong to obovate-oval, obtuse or subacute, the innermost obovate, rounded at the apex; rays about 2 cm. long; pappus none.

Tithonia rotundifolia (Mill.) Blake. *T. aristata* Oerst. Vid. Medd. Kjoebenhavn 1852: 114. 1853 (Cerro de Aguacate, *Oersted*). *T. speciosa* Hook. *Urbanisol aristatus* Kuntze, Rev. Gen. 1: 371. 1891. In thickets and fields, often along streams, Meseta Central to the Pacific coast; Guanacaste; region of San Ramón. Panama to Mexico. A stout annual, usually 1–2 meters high, the younger parts densely grayish-pilosulous; leaves large, broad, mostly trilobate, the lobes caudate-acuminate, hispid-pilose on both sides; disk 2–3 cm. broad; involucre 2-seriate, the phyllaries ovate to ovate-oblong, acute or acuminate, the outer ones with herbaceous tips, pilosulous or glabrate; rays 2–2.5 cm. long; achenes pilose, the pappus of squamellae and 2 awns.

TRIDAX L.

Annual or perennial herbs, usually low, often prostrate or procumbent; leaves opposite, dentate or incised; heads radiate, long-pedunculate, the rays often trilobate; involucre ovoid to hemispheric, the phyllaries subequal, few-seriate; receptacle flat or convex, paleaceous; achenes sericeous-villous; pappus of numerous aristate, plumose scales.—One or two other species may reach northern Central America.

Tridax procumbens L. Frequent in waste ground or thickets, Pacific tierra caliente; probably also in the Atlantic tierra caliente. Widely distributed in tropical America. Plants hirsute, branched from the base, the branches prostrate or ascending; leaves ovate to ovate-lanceolate, 2–6 cm. long, short-petiolate, acute or acuminate, incised-dentate, cuneate at the base; peduncles solitary, terminal, 10–30 cm. long; involucre campanulate, 6 mm. high, hispid, the inner phyllaries elliptic, the outer lanceolate; rays almost white; achenes 2 mm. long. One of the most common weeds in many parts of the Central American tierra caliente.

TRIXIS P. Br.

Reference: Robinson & Greenman, Revision of the Mexican and Central American species of *Trixis*, Proc. Amer. Acad. 40: 6–14. 1904.

Shrubs, often somewhat scandent; leaves alternate, entire or dentate; heads yellow, cymose or paniculate; involucre double, the outer phyllaries few, usually shorter, linear to ovate, herbaceous, the inner ones 5–10, equal, subherbaceous; flowers all perfect and fertile, the corollas all bilabiate; achenes subcylindric, papillose; pappus of numerous bristles, usually brownish.—A few other species are known to occur in Central America.

Trixis divaricata (HBK.) Spreng. Reported from El General, the determination by Blake. Unknown elsewhere in North America, but extending southward to Argentina. A slender shrub, probably more or less scandent; leaves sessile or nearly so, oblong-lanceolate or linear-lanceolate, subentire, attenuate-acuminate, acute at the base, green above but sericeous, densely pale-tomentose beneath; branches of the inflorescence flexuous, the cymes open, the heads mostly pedicellate, 1 cm. long.

Trixis radialis (L.) Kuntze. *T. frutescens* P. Br. In thickets and hedges, Meseta Central to the Pacific coast; region of San Ramón; Guanacaste. Widely distributed in tropical America. A shrub of 1–2.5 meters, the branches often recurved or subscandent, glabrous or sparsely appressed-pilose; leaves narrowly lanceolate to lance-ovate, 3–10 cm. long, acuminate, subentire, glabrous or glabrate; inflorescence dense and leafy, the heads sessile or short-pedicellate, 1.5–2 cm. high. One of the common, weedy shrubs in the Pacific tierra caliente of Central America, rather showy and handsome when in full bloom.

VERBESINA L.

Reference: Robinson & Greenman, Synopsis of the genus *Verbesina*, with an analytical key to the species, Proc. Amer. Acad. 34: 534–566. 1899.

Herbs, shrubs, or small trees; leaves opposite or alternate, dentate to pinnate-lobate; heads small or medium-sized, radiate or discoid, solitary to numerous and paniculate, yellow, orange, or white; phyllaries about 2-seriate, usually unequal and more or less herbaceous; rays usually fertile; achenes strongly compressed, 2-winged; pappus of 2 awns, rarely none.—Other species are found in Central America.

Verbesina Fraseri Hemsl. Hacienda La Argentina, Grecia, 825 meters, *M. Valerio 580*. Extending to Guatemala. Plants apparently somewhat scandent, the stems broadly winged, glabrous or glabrate; leaves scabrous, opposite, deeply pinnate-lobate; heads large, subglobose, discoid; outer phyllaries obovate or oblanceolate, obtuse. From Costa Rica I have seen a single sterile specimen that seems to belong here, but it may be that it is merely an abnormal form of *V. Tonduzii*.

Verbesina myriocephala Schultz Bip. Thickets, fields, and hedges of the Meseta Central; region of San Ramón. Panama to southern Mexico. A coarse, branched herb, 1.5–3 meters high, the stems glabrous, usually dark purple; leaves alternate, large, deeply pinnatifid, scabrous above, soft-pilose or rarely glabrate beneath; heads dirty white, discoid, 8 mm. high, forming large, dense, terminal corymbs; phyllaries narrowly oblong; achenes obscurely winged. *V. costaricensis* Robinson, Proc. Amer. Acad. 47: 212. 1911 (Río Virilla, San José, *Tonduz 9833*), seems to be doubtfully if at all distinct from *V. myriocephala*. Costa Rican material of this species has been referred also to *V. nicaraguensis* Benth. and *V. gigantea* Jacq.

Verbesina Oerstediana Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 96. 1853. *Torilla*. Southern slope of Volcán de Irazú, 2,400–2,850 meters, *Oersted 8729* (photo. and duplicate of the type in Herb. Field Mus.). Frequent in thickets and forest of the central region, especially on the middle and higher slopes of the mountains; region of San Ramón; at 1,000–2,900 meters. Endemic. A shrub or tree, sometimes 9 meters high, with a trunk 25 cm. in diameter, the branches pilose or subtomentose; leaves short-petiolate, lance-oblong or oblong-oblanceolate, acuminate, attenuate to the base, pilose or glabrate above, densely or sparsely pilose beneath, rather inconspicuously denticulate; heads bright yellow, radiate, forming large or small, compact corymbs at the tips of the branches; involucre 5 mm. high; achenes narrowly winged. Var. *glabrior* Blake (Field Mus. Bot. 17: 404. 1938; oak forest, Santa María de Dota, *Standley 41619*) is a form with less abundant and shorter pubescence than the type. It occurs chiefly at lower elevations than typical *V. Oerstediana*.

Verbesina sublobata Benth. *Tora*. Thickets and fields of the Meseta Central; region of Dota; San Ramón; 1,000–1,800 meters. Extending to southern Mexico. An herb or shrub of 1–4.5 meters, the branches densely sordid-tomentose or pilose, not winged; leaves alternate, large, deeply sinuate-lobate, very rough above, pilose-tomentose beneath; heads very numerous, dirty white, with short and inconspicuous rays; involucre 3 mm. high, the phyllaries linear or oblanceolate; achenes narrowly winged.

Verbesina Tonduzii Greenm. Proc. Amer. Acad. 40: 42. 1904. Las Vueltas, Tucurrique, 635 meters, *Tonduz 12765*. In thickets or open, dry forest, tierra caliente, ascending to about 1,000 meters on the Pacific slope; region of San Ramón; Guanacaste. Nicaragua. A small, suffrutescent vine, the stems narrowly winged, glabrous or nearly so; leaves opposite, ovate, 5–14 cm. long, acuminate, unequally sinuate-dentate, narrowed to the base, rough-pubescent; heads few, solitary at the ends of long, naked peduncles, discoid, bright orange, 1.5–2.5 cm. broad; phyllaries very numerous, densely puberulent; achenes broadly winged, 5–7 mm. long. Called Capitaneja in Nicaragua. Costa Rican collections have been referred to *V. Fraseri* Hemsl. and *V. crocata* (Cav.) Less. The species is very close to *V. crocata,* differing principally in leaf characters.

Verbesina turbacensis HBK. *V. nicaraguensis* Benth.; *V. microcephala* Benth. Thickets and fields of the Meseta Central; regions of Dota and El General; 600–1,300 meters. Mexico to Colombia. Plants tall and coarse, herbaceous or somewhat woody, commonly 1–3 meters high, the branches densely sordid-tomentose, winged by the decurrent leaf bases; leaves large, alternate, deeply pinnate-lobate, rough above, puberulent or tomentose beneath; heads very numerous, white, forming large, corymbose panicles, the white rays very small; involucre 3 mm. high.

VERNONIA Schreb.

Reference: Gleason, N. Amer. Fl. 33: 52–101. 1922.

Annual or perennial herbs, shrubs, trees, or woody vines; leaves alternate, entire or dentate; heads discoid, white, pink, or blue, mostly in scorpioid cymes, these usually panicled, the heads sometimes solitary or corymbose, 5–many-flowered; involucre cylindric to campanulate, the phyllaries laxly or closely imbricate in few or numerous series, the outer ones shorter; receptacle flat or subconvex; achenes costate or smooth, truncate; pappus biseriate, the outer short, of scales or bristles, the inner of stiff bristles.—Other species occur in Central America.

Vernonia argyropappa Buek. Occasional in thickets and forest of the central region; apparently common in the region of San Ramón; 1,000–1,800 meters. Southern Mexico to South America. Plants herbaceous or suffrutescent, 1–1.5 meters high, sparsely branched, the branches brown-pilose; leaves oblong-lanceolate, 8–12 cm. long, acuminate, entire or nearly so, pilose above, strigose-hirsute and resinous beneath; inflorescence leafy-bracted, the branches long and slender; heads 20–30-flowered, the involucre 8–10 mm. high, the flowers bright purple; phyllaries subulate, erect; pappus white; achenes 3 mm. long, hirsute. Costa Rican material of this species was listed by Klatt as *V. remotiflora* var. *tricholepis* Baker.

Vernonia brachiata Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 67. 1853. *Caña de danto, Tabaquillo. Cacalia brachiata* Kuntze, Rev. Gen. 969. 1891. Cerro de Aguacate, 600 meters, *Oersted* (photo. of type in Herb. Field Mus.). Frequent in thickets and open forest of the tierra caliente, especially the Atlantic, ascending in the central mountains to about 1,500 meters, but rare at higher elevations; region of San Ramón; Atlantic slope of Guanacaste. Also in northern South America. Plants herbaceous or suffrutescent, 1–2.5 meters high, the stems glabrous or nearly so; leaves thin, elliptic, 10–20 cm. long, acute or acuminate, narrowed to the base, entire or serrulate, almost glabrous; branches of the inflorescence very long and slender, leafless; heads 21-flowered, purple, the involucre 3–4 mm. high; phyllaries ciliate, acute or acuminate; achenes sparsely hirsute; pappus brownish.

Vernonia canescens HBK. *V. bullata* Benth. in Oerst. Vid. Medd. Kjoebenhavn 67. 1853 (mountains south of Cartago, 1,500 meters, *Oersted 8540;* photo. of type in Herb. Field Mus.). *Cacalia bullata* Kuntze, Rev. Gen. 969. 1891. Common in thickets of the Meseta Central, ascending to 1,800 meters or more; region of San Ramón; Guanacaste. Mexico to South America. A slender shrub of 1–3 meters, sometimes somewhat scandent, the branches pubescent or glabrate; leaves rather rigid, often bullate, oblong-lanceolate to broadly ovate, 5–10 cm. long, acuminate, rounded or obtuse at the base, entire, rough above, densely strigose and resinous beneath; inflorescence large and usually much branched, the bracts small and inconspicuous; heads pink, 21-flowered, the involucre 4–5 mm. high; phyllaries laxly villous, triangular-subulate or lanceolate, acuminate; achenes 2 mm. long, hirsute; pappus white. A common, weedy shrub in the central region, where it often forms extensive thickets. Material referred by Klatt to *V. mollis* HBK. probably is to be placed here.

Vernonia Lankesteri Blake, Journ. Wash. Acad. Sci. 15: 106. 1925. Santa Clara de Cartago, *Lankester 712.* Occasional in forests of the central region, especially in the mountains south of Cartago; La Palma de San José; chiefly at 1,500–2,500 meters. Endemic. Plants suffrutescent, 1–3 meters high, the young branches tomentose; leaves obovate, 12–21 cm. long, acuminate, long-attenuate to the base, serrate, glabrate in age; heads in panicles of 4–8, about 2.5 cm. broad, rose-purple; phyllaries triangular to oblong-obovate, with broad, obtuse or rounded, herbaceous, spreading tips; achenes glabrous; pappus yellowish white. A showy and unusually handsome plant, very different in general appearance from other local species. The heads are much larger than in other species occurring in Costa Rica. *Vernonia Salvinae* Hemsl. was reported from Costa Rica by Gleason on the basis of a specimen really referable to *V. Lankesteri.*

Vernonia patens HBK. *Tuete, Tuete blanco. V. pacchensis* Benth. In thickets of the tierra caliente, ascending to the region of La Palma, about 1,400 meters. Southern Mexico to South America. A stiff shrub of 2–3 meters, the stems puberulent or glabrate; leaves thick and stiff, oblong-lanceolate, 8–15 cm. long, often rugose, acuminate, narrowed to the base, entire or serrulate, puberulent, the hairs of the lower surface very short and conic; inflorescence large but dense, the branches short; heads 21-flowered, the flowers white or pale pink, fragrant; involucre 4–5 mm. high, the phyllaries appressed, subacuminate to rounded at the apex, tomentose-ciliate; achenes minutely pubescent, the pappus pale brown.

Vernonia Seemanniana Steetz is reported from Costa Rica by Gleason, but probably in error. The type locality is Volcán de Chiriquí, Panama (not Costa Rica, as stated by Gleason), and very likely the species is endemic there.

Vernonia stellaris Llave & Lexarza. *Tuete. V. Deppeana* Less. Common in thickets or forest of the Meseta Central; region of San Ramón; chiefly at 900–1,300 meters. Ranging to Mexico. A shrub of 3–6 meters, the branches pubescent or tomentose; leaves oblong to narrowly elliptic, 8–10 cm. long, acute, narrowed to rounded at the base, entire or nearly so, rough above, tomentose beneath; inflorescence large and much branched, the branches short; heads white or pale pink, the flowers fragrant; involucre 3–4 mm. high, the phyllaries erect or appressed, ovate to oblong, acute or acuminate, arachnoid-ciliate; achenes pubescent, the pappus fulvous.

Vernonia triflosculosa HBK. *Quitirrí. Eremosis triflosculosa* Gleason. Frequent in thickets or forest about San José and in the region of San Ramón, 1,000–2,000 meters. Panama to southern Mexico. A shrub or tree, sometimes 6 meters high or more, the trunk as much as 15 cm. in diameter, the crown rounded, the branches pubescent or glabrate; leaves thin, oblanceolate to elliptic, 8–12 cm. long, acute or acuminate, attenuate to the base, entire or nearly so, nearly or quite glabrous; heads 3-flowered, white, in small, dense clusters arranged in leafy panicles; involucre cylindric, pale brown, 4–5 mm. high, the phyllaries subrotund to oblong, acute, glabrous or nearly so, minutely ciliate; achenes pubescent, the pappus white.

Vernonia vernicosa Klatt, Bull. Soc. Bot. Belg. 35: 294. 1896. *Tuete*. *V. vernicosa* var. *comosa* Greenm. Proc. Amer. Acad. 30: 93. 1903 (Matamber, near Nicoya, *Tonduz 13607*). Banks of Río Virilla, *Tonduz 7065* (*9860*). Frequent in thickets, region of San José to the Pacific coast; region of San Ramón; Guanacaste. Endemic. A stout shrub of 1–2.5 meters, the branches sparsely pubescent or glabrate; leaves coriaceous, oblong-lanceolate to ovate, 6–10 cm. long, acute or acuminate, rounded at the base, entire, strigose-hirsute or glabrate; inflorescence lax and sparsely branched, very leafy; heads about 50-flowered, white or pale pink, fragrant; involucre 1 cm. high, the phyllaries very numerous, appressed, narrow, sparsely villous or glabrous; achenes hirsute; pappus white. This species usually has been confused with *V. tortuosa* (L.) Blake (*V. Schiedeana* Less.), a plant of Mexico and northern Central America.

VIGUIERA HBK.

Reference: Blake, A revision of the genus *Viguiera*, Contr. Gray Herb. 54: 1–205. *pl. 1–3*. 1918.

Herbs or shrubs, usually with rough pubescence; leaves opposite, at least the lower ones; heads small or large, yellow, radiate; involucre 2–7-seriate, the phyllaries graduated or subequal, usually with indurate base and herbaceous tip; rays neutral; achenes thick, the pappus persistent, of 2 awns and several free or united squamellae, or wanting.—A few other species are known in Central America.

Viguiera strigosa Klatt, Bull. Soc. Bot. Belg. 31: 204. 1892. El Rodeo, Río Tiribí, 700 meters, *Pittier 1604*. Collected also at Líbano, Guanacaste, in dry forest. Endemic. Herbaceous, the stems sparsely pilose and puberulous; leaves rhombic-ovate or lance-ovate, acuminate, cuneate at the base, crenate-serrate, hispid-strigose above, beneath sparsely strigillose and somewhat gland-dotted, petiolate; heads long-pedunculate, the disk 6 mm. high, in age 9–11 mm. thick; phyllaries 2-seriate, obovate-oblong, sparsely strigillose, acute; achenes appressed-pilose, 3 mm. long; pappus of 2 awns and about 6 unequal squamellae.

Viguiera sylvatica Klatt, Bull. Soc. Bot. Belg. 31: 204. 1892. "Massif du Barba," Carrizal, 1,900 meters, *Pittier 779*. Collected also at San Ramón and in El General; Cerro de La Carpintera; region of Dota. Panama. Herbaceous, the stems hispid-pilose; leaves ovate, acuminate, cuneate to rounded at the base, serrate, strigillose and short-hispid above, hispidulous-pilosulous and hispid beneath; heads numerous, irregularly paniculate; involucre 2-seriate, 5–7 mm.

high; phyllaries oblong-lanceolate, short-acuminate, hispid-pilose; achenes black and white, appressed-pilose, 2.6 mm. long; pappus of 2 awns and 6 lacerate squamellae.

Viguiera tenuis Gray. Region of Boruca. Panama to Mexico. A slender annual, 30–50 cm. high; stems strigose or strigose-hispid; leaves mostly opposite, sessile, lanceolate or lance-ovate, 3–6 cm. long, acuminate, rounded or cuneate at the base, entire or serrulate, strigose-pilose; disk 8–9 mm. high; involucre 2-seriate, the phyllaries narrowly linear-lanceolate, attenuate almost from the base, canescent-strigillose; achenes subsericeous, 2.5 mm. long; pappus of 2 awns and about 6 lacerate squamellae.

WEDELIA Jacq.

Erect or prostrate herbs; leaves opposite, entire or dentate, sometimes lobate; heads small, radiate, yellow, long-pedunculate; phyllaries about 2-seriate, the outer more or less foliaceous, receptacle plane or convex, paleaceous; ray flowers pistillate, the disk flowers perfect; achenes oblong to obovate, glabrous, pilose, or tuberculate; pappus cupuliform, dentate, or obsolete.—A few other species are found in Central America.

Wedelia acapulcensis HBK. *Botón de oro.* Frequent in thickets or waste places, Meseta Central to the Atlantic tierra caliente, and in the upper part of the Pacific tierra caliente. Panama to Mexico, and perhaps ranging even more widely. Plants annual, erect or ascending, branched, hispidulous-pilose, very rough; leaves petiolate, ovate to lanceolate, coarsely dentate, sometimes obscurely trilobate, acuminate; heads few, mostly solitary, long-pedunculate, the disk 8 mm. high, the phyllaries broad, green; rays short, yellow.

Wedelia trilobata (L.) Hitchc. *W. carnosa* L. Rich. Frequent on or near seashores. Widely distributed in tropical America. Plants succulent, prostrate or ascending, branched, almost glabrous, rarely pilose, often rooting at the nodes; leaves elliptic to obovate, obtuse or acute, dentate and often 3-lobate, sessile, cuneate at the base; peduncles solitary in the upper leaf axils; involucre 8–12 mm. long, the 5 phyllaries oblong-obovate, green; rays 1–1.5 cm. long; achenes 5 mm. long, tuberculate. The species is reported for Costa Rica by Klatt under the name *W. paludosa* var. *vialis* DC.

ZEXMENIA Llave

Reference: W. W. Jones, A revision of the genus *Zexmenia*, Proc. Amer. Acad. 41: 143–167. 1905.

Shrubs or herbs; leaves opposite, rarely alternate, chiefly ovate, serrate, petiolate; heads solitary, umbellate-cymose, or paniculate, yellow, radiate; involucre 2–5-seriate, the phyllaries graduated or subequal, usually ovate or oblong and with herbaceous tips; rays fertile; receptacle paleaceous; disk achenes compressed, oblong or obovate, acute-marginate or winged; pappus of 2–3 awns and several usually connate squamellae, the squamellae sometimes reduced to an entire crown or obsolete.—A few other species are found in Central America.

Zexmenia aurantiaca Klatt, Bull. Soc. Bot. Belg. 35: 296. 1896. Banks of Río Virilla, 1,100 meters, *Tonduz 9836* (*7071*). Apparently known only from the original material. A shrub, scabrous; leaves ovate, serrulate, acuminate, abruptly decurrent at the base; heads terminal, solitary or in 3's, 1–1.5 cm. high; involucre biseriate, the outer phyllaries ovate-lanceolate, densely pubescent; achenes 4–5 mm. long, with plumose awns and several unequal, aristiform squamellae.

Zexmenia frutescens (Mill.) Blake. *Z. costaricensis* Benth. in Oerst. Vid. Medd. Kjoebenhavn 1852: 95. 1853. In thickets, Meseta Central to the Atlantic tierra caliente; upper part of the Pacific tierra caliente; region of San Ramón. Panama to southern Mexico. A shrub or tree, sometimes 8 meters high, the branches pubescent or glabrate; leaves ovate, 6–15 cm. long, acuminate, cuneate at the base, serrate, rough above, almost glabrous to strigose or hispidulous beneath; heads numerous, in umbelliform cymes, long-pedicellate; involucre 7–12 mm. high, the phyllaries few-seriate, subequal, usually oblong and obtuse, glabrate or densely pubescent. *Z. frutescens* var. *villosa* (Polak.) Blake, Contr. Gray Herb. 52: 50. 1917 (*Z. villosa* Polak. Linnaea 41: 579. 1877; *Z. costaricensis* var. *villosa* Blake, Journ. Bot. 53: 14. 1915; type from San José, *Polakowsky 466*) is a more densely pubescent form, common in Costa Rica.

Zexmenia iners Blake. Thickets and forest of the Atlantic tierra caliente. Salvador. Plants annual, erect or decumbent, the stems hirsutulous and hispid; leaves petiolate, ovate or oblong-ovate, 3–7 cm. long, acute or acuminate, cuneate at the base, serrate, hispid; heads solitary; involucre 6–8 mm. high, the phyllaries lanceolate or oblong-lanceolate, obtuse or subacute, hispid-ciliate; ligules only 3–3.5 mm. long; achenes 5.5 mm. long, winged; pappus a lacerate corona and 2 short awns.

Zexmenia longipes Benth. *Aspilia costaricensis* Klatt, Bull. Soc. Bot. Belg. 34: 286. 1896. Thickets of the Pacific tierra caliente, ascending to the region of Escazú; region of San Ramón; Guanacaste. Nicaragua. A coarse, much branched herb, 1–1.5 meters high, the stems hispid; leaves ovate or broadly ovate, 3–15 cm. long, acuminate, serrate, petiolate, strigose above, hirsute-villous beneath; peduncles elongate, mostly solitary, hirsute; heads about 1 cm. high; involucre 2–3-seriate, narrow, the phyllaries lanceolate, hirsute; achenes conspicuously 2-winged; disk achenes hirsute. Costa Rican material was referred incorrectly by Klatt to *Zexmenia hispida* (HBK.) Gray, a Mexican species.

Zexmenia Pittieri Greenm. ex W. W. Jones, Proc. Amer. Acad. 41: 156. 1905. In forest, Tsaki, Talamanca, 200 meters, *Pittier 9565*. Apparently known only from the original material. Stems strigillose; leaves elliptic-oblong, 10–15 cm. long, short-acuminate, rounded or obtuse at the base, remotely denticulate, hirtellous, short-petiolate; heads 6–8 mm. high, forming a terminal, corymbose panicle; involucre 3-seriate, the phyllaries 3–4 mm. long, appressed-hirtellous; ligules small and inconspicuous; achenes glabrous, ciliate.

Zexmenia virgulta Klatt, Bull. Soc. Bot. Belg. 31: 203. 1892. Río San Pedro, between El General and Buenos Aires, *Pittier 3711*. Frequent in forest or thickets, mountains about the Meseta Central to the Atlantic coast, and in the upper part of the Pacific tierra caliente; region of San Ramón; Guanacaste. Ranging to Guatemala. A shrub or small tree, often subscandent, as much as 6 meters long, the branches fuscous-hirsute; leaves ovate-lanceolate or lance-oblong, coriaceous, 5–15 cm. long, acuminate, acute to rounded at the base, serrate or almost entire, strigose above, villous beneath; heads corymbose, long-pedicellate, 1 cm. high; involucre campanulate, 1–2 cm. broad; outer phyllaries linear-lanceolate, foliaceous, spreading or reflexed; achenes winged.

ZINNIA L.

Annual or perennial herbs or low shrubs; leaves opposite, entire or remotely serrate, usually narrow and sessile; heads large or medium-sized, radiate, variously colored; ray flowers pistillate, the rays persistent upon the achene; receptacle conic, paleaceous; phyllaries firm, obtuse, appressed, imbricate in several series; achenes 3-angulate or compressed; pappus of a few awns or teeth.—One species of the genus may be native in northern Central America. Several are found in Mexico.

Zinnia elegans Jacq. *San Rafael, Matrimonio.* Planted commonly in gardens for ornament. Probably native of Mexico. A tall and rather coarse annual; heads often "double," variable in color, white to purple, pink, red, and yellow.

ADDITIONS AND CORRECTIONS

Wherever the locality name Jaris occurs in the text it should appear without an accent—not Jarís.

Page 46. In line 3 the year should be 1846, not 1864.

Page 66. After *Potamogeton foliosus* insert the following genus:

ZANNICHELLIA L.

The genus is represented in North America by a single species.

Zannichellia palustris L. Estero al sur del Peñón de Los Loros, Pacific coast, *Brenes 22682.* Generally distributed in both hemispheres. A slender, aquatic plant, growing in fresh or brackish water; leaves linear, almost capillary, 2–10 cm. long; flowers monoecious, with 1 stamen, axillary, enclosed at first in a hyaline, deciduous spathe; mature fruit a stipitate, smooth or muricate nutlet.

Page 67. Before *Echinodorus tenellus* insert the following species:

Echinodorus subalatus (Mart.) Griseb. Colorado de Coto, *M. Valerio 1389.* Guianas and Brazil. A rather stout and coarse herb; leaves long-petiolate, the blades lanceolate or elliptic-oblong, 10–20 cm. long, acute at each end, 5-nerved; scapes erect, bearing 8–12 whorls of short-pedicellate, white flowers. The species is, apparently, new for the Central American flora.

Page 72. Cenchrus echinatus. Like other species of the genus, called Abrojo in Costa Rica.

Page 102. The species listed as *Fimbristylis diphylla* should be called *Fimbristylis dichotoma* (L.) Vahl. See Kew Bull. 150. 1935.

Page 103. After *Rynchospora armerioides* insert:

Rynchospora barbata (Vahl) Kunth. Buenos Aires, 480 meters, *M. Valerio 880.* The species is a savanna plant, and has a wide range in Central America and northern South America.

Page 122. **Manicaria saccifera** Gaertn. Mr. C. H. Lankester writes that in northern Sarapiquí this palm is called Sílico.

Page 146. Before *Spirodela* insert:

LEMNA L.

Several species of the genus are known from Central America.

Lemna minima Phil. Finca Canadá, Turrialba, *Manuel Quirós 775.* Like most other members of the genus, a species of wide distribution.

Lemna perpusilla Torr. *Manuel Quirós 750,* without locality. A species of wide distribution in America.

Page 147. The proper citation for the single species of *Paepalanthus* is as follows: **Paepalanthus costaricensis** Moldenke ex Standl. Field Mus. Bot. 18: 147. Oct., 1937, nomen; Moldenke, N. Amer. Fl. 19: 38. Nov. 27, 1937.

Page 169. Before *Gloriosa* insert the following:

Excremis scabra Kuntze, Rev. Gen. 3, pt. 2: 316. 1898. This species was based upon a specimen collected by Kuntze in Bolivia, and another from Costa Rica, *Polakowsky 461.* I have seen no Costa Rican material referable to the genus. If the Polakowsky plant is really an *Excremis,* probably it was found in cultivation.

After *Gloriosa* insert:

HEMEROCALLIS L.

Hemerocallis fulva L. Cultivated at Zarcero and also naturalized in some localities, *Austin Smith A5.* Native of Europe and Asia.

Page 170. Before *Sabadilla* insert:

ORNITHOGALUM L.

Ornithogalum thyrsoides Jacq. Zarcero, *Austin Smith;* cultivated in gardens for ornament, and spreading rapidly by self-sown seeds. Native of South Africa.

In place of *Nothoscordum bivalve* substitute the name **Nothoscordum fragrans** (Vent.) Kunth. *N. bivalve* is a distinct species, not known to occur in Costa Rica.

Page 189. Before *Languas* insert:

KAEMPFERIA L.

All species of the genus are natives of Asia and the East Indies.

Kaempferia rotunda L. In cultivation at Zarcero, *Austin Smith H611.* Native of the East Indies. Mr. Smith states that the rhizome was brought from nearby woodland, and it may be that the plant has escaped from earlier cultivation. It is noteworthy for its habit of growth. At time of flowering, no leaves are present, but the few large flowers arise from the rootstock and appear just above the ground. They are orchid-like in appearance, and show a beautiful combination of white and violet.

Page 211. *Dichaea Bradeorum* is to be reduced to synonymy under *D. Morrisii* (page 212). See Schweinfurth, Bot. Mus. Leafl. Harvard Univ. 6: 7. 1938.

Page 212. After *Dichaea echinocarpa* insert:

Dichaea gracillima Schweinf. Bot. Mus. Leafl. Harvard Univ. 5: 98. 1938. Piedades de San Ramón, 1,100 meters, *Brenes 1459.* Known only from the type.

Under *Dichaea muricata* are to be listed as synonyms *D. ovatipetala* (page 212) and *D. similis* and *D. verrucosa* (page 213). See Schweinfurth, Bot. Mus. Leafl. Harvard Univ. 6: 9. 1938.

After *Dichaea poicillantha* insert:

Dichaea Powellii Schlechter. A synonym of this is *D. Brenesii* Schlechter (page 211). The species occurs also in Panama.

Page 214. Before *Elleanthus laxus* insert:

Elleanthus Jimenezii (Schlechter) Schweinf. Bot. Mus. Leafl. Harvard Univ. 5: 38. 1937. *Epilyna Jimenezii* Schlechter (see page 230). The generic name *Epilyna* becomes a synonym of *Elleanthus.*

Page 222. **Epidendrum notabile.** Collected also at La Palma, 1,500 meters, *M. Valerio 2480.* See Schweinfurth, Bot. Mus. Leafl. Harvard Univ. 6: 4. 1938.

Page 224. Before *Epidendrum paranthicum* insert:

Epidendrum pansamalae Schlechter. La Fuente, 1,200 meters, *Alfaro 217.* Also in Guatemala. See Schweinfurth, Bot. Mus. Leafl. Harvard Univ. 5: 144. 1938.

Before *Epidendrum platystigma* insert:

Epidendrum pinniferum Schweinf. Bot. Mus. Leafl. Harvard Univ. 5: 92. 1938. Matamba, between Pirris and San Jerónimo, *A. Brade 335.* Known only from the type.

Page 246. After *Liparis fratrum* insert:

Liparis tipuloides (Lindl.) Schlechter. A synonym is *L. eustachys* Schlechter. The species occurs also in Colombia. See Schweinfurth, Bot. Mus. Leafl. Harvard Univ. 6: 2. 1938.

Page 249. After *Malaxis macrostachya* insert:

Malaxis nana Schweinf. Bot. Mus. Leafl. Harvard Univ. 5: 89. 1938. Forests of San Pedro de Ramón, 850 meters, *Brenes 1301*. Cerro de San Isidro de San Ramón, 1,175 meters, *Brenes 1334*. Endemic.

Page 255. After *Maxillaria caespitifica* insert:

Maxillaria campanulata Schweinf. Bot. Mus. Leafl. Harvard Univ. 5: 94. 1938. El Tablazo(?), *Salvador Jiménez C. 315*. Known only from the original material.

Page 263. **Oncidium cabagrae.** To the synonymy of this species add *O. Rechingerianum* (page 266).

Page 266. **Oncidium obryzatoides.** To the synonymy of this species add *O. fulgens* Schlechter (page 264) and *O. Brenesii* Schlechter (page 263). See Schweinfurth, Bot. Mus. Leafl. Harvard Univ. 6: 6. 1938.

Page 277. After *Pleurothallis Johannis* add:

Pleurothallis lanceola Spreng. Collected in Costa Rica by Skutch (*No. 3290*). Also in Jamaica.

Page 278. After *Pleurothallis melanopus* insert:

Pleurothallis membraniflora Schweinf. Bot. Mus. Leafl. Harvard Univ. 5: 91. 1938. San Pedro de San Ramón, *Brenes 20571*. Known only from the type.

Page 284. After *Pleurothallis trachytheca* insert:

Pleurothallis triangulabia Schweinf. Palmira de Alfaro Ruiz, 1,740 meters, *Austin Smith A128*. Also in Panama.

After *Pleurothallis uncinata* insert:

Pleurothallis Urbaniana Reichenb. f. A synonym of this is *P. divexa* Ames (page 275). The species occurs in Panama and West Indies.

Page 286. After *Ponthieva racemosa* insert:

Ponthieva Tuerckheimii Schlechter. A synonym is *P. gracilispica* Schlechter (page 286). See Schweinfurth, Bot. Mus. Leafl. Harvard Univ. 6: 1. 1938.

Page 293. After *Sobralia pleiantha* insert:

Sobralia undatocarinata Schweinf. Bot. Mus. Leafl. Harv. Univ. 6: 197. 1938. La Estrella de Cartago, *Brenes 206*. La Palma de San José, 1,500 meters, *M. Valerio 2412*. Endemic.

Page 295. **Stanhopea costaricensis.** The local name is Torito.

Stanhopea ecornuta. A local name is Flor de vaca.

Page 299. After *Stelis persimilis* insert:

Stelis planipetala Ames, Bot. Mus. Leafl. Harvard Univ. 6: 13. *pl.* 1938. Vicinity of El General, Prov. San José, 1,130 meters, *Skutch 2825*. Known only from the type.

After *Stelis Sanchoi* insert:

Stelis Skutchii Ames, Bot. Mus. Leafl. Harvard Univ. 6: 17. *pl.* 1938. Vara Blanca de Sarapiquí, 1,500–1,750 meters, *Skutch 3126*. Known only from the type.

Page 301. Before *Telipogon Biolleyi* insert:

Telipogon ampliflorus Schweinf. Bot. Mus. Leafl. Harvard Univ. 6: 34. 1938. Near Laguna de La Escuadra, northeast of El Copey, Prov. San José, 2,000–2,200 meters, *Standley 42021*. Known only from the type.

Page 302. After *Telipogon Pfavii* insert:

Telipogon setosus Ames, Bot. Mus. Leafl. Harvard Univ. 6: 28. *pl.* 1938. Vara Blanca de Sarapiquí, 1,500–1,750 meters, *Skutch 3246*.

Page 308. After *Peperomia atirroana* insert:

Peperomia Austini Trelease, sp. nov.—Herba modice parva essentialiter glabra caespitosa truncicola, caule gracili; folia alterna subrhombeo-ovata vel inferiora rotundata subacuta, basi acuta, 2–2.5 cm. longa 1–1.5 cm. lata, trinervia coriacea, supra rubescentia,

subtus pallidiora, petiolo 5 mm. longo amplexicauli-decurrente; spicae terminales et ex axillis superioribus 50–80 mm. longae 1 mm. crassae, pseudopedicellis conicis, pedunculo 5 mm. longo.—Palmira, 1,740 meters, *Austin Smith A147* (type in Herb. Field Mus.).

Page 312. After *Peperomia defracta* insert:

Peperomia defrenata Trelease, sp. nov.—Herba parva simplex erecta glabra, caule gracili plus minusve geniculato; folia alterna lanceolato-elliptica utrinque subacuta, vix 15 mm. longa atque 5 mm. lata, trinervia, coriacea, subtus pallidiora; petiolus 3 mm. longus; spicae terminales in statu juvenili 20 mm. longae 2 mm. crassae, pedunculo gracili aequilongo.—Pejivalle, Prov. Cartago, *M. Valerio A70* (type in Herb. Field Mus.).

After *Peperomia delicatissima* insert:

Peperomia delicatissima Trelease, var. **venusta** Trelease, var. nov.—Herba delicata repens, foliis superne sparse longiciliatis exceptis glabra, caule filiformi; folia alterna rotundata vel oblata, interdum emarginulata, acuta, basi obtusa, vix 3 mm. longa, perobscure ca. 3-nervia, petiolo filiformi.—San Pedro de San Ramón, *Brenes 22567* (type in Herb. Field Mus.).

Page 315. After *Peperomia gallitoensis* insert:

Peperomia Garrapatilla Trelease, sp. nov.—*Garrapatilla.* Herba subparva erecta compacte ramosa fere ubique longivelutina, caule basin versus crasso (4 mm.) striato; folia congesta ad nodum ca. 4, elliptica, utrinque subobtusa vel apice subemarginulata, vix 6 mm. longa atque 3 mm. lata, in sicco valde coriacea, 1-nervia, subtus valde granulosa, petiolo vix 1 mm. longo; inflorescentia non visa.—San Marcos de Tarrazú, *M. Valerio A21* (type in Herb. Field Mus.).

Page 317. After *Peperomia longibacca* insert:

Peperomia Manueli Trelease, sp. nov.—Herba modice alta simplex erecta glabra, caule 2–4 mm. crasso inferne nudo; folia ad nodum ca. 3 lanceolata utrinque aequaliter acutata, ca. 20 mm. longa atque 6 mm. lata, trinervia coriacea, petiolo 5 mm. longo; spicae axillares subnumerosae ca. 30 mm. longae atque 2 mm. crassae densiflorae, pedunculo 10–15 mm. longo.—Vara Blanca, 1,800 meters, *Manuel Valerio 1615* (type in Herb. Field Mus.).

Page 318. After *Peperomia muscisedens* insert:

Peperomia muscotecta Trelease, sp. nov.—Herba parva fere glabra in truncis muscosis repens, caulibus brevibus foliosis filiformibus; folia ad nodum ca. 4 suboblonga obtusa, basi acuta, vix 5 mm. longa atque 2 mm. lata, coriacea, revoluta, 1-nervia, apicem versus ciliata, petiolo vix 1 mm. longo; spicae terminales et ex axillis superioribus nascentes, 15 mm. longae 1 mm. crassae, pedunculo 5–10 mm. longo.—Vara Blanca, Sarapiquí, 1,800 meters, *Skutch 3369* (type in U. S. Nat. Herb.).

Page 319. After *Peperomia niveo-punctulata* insert:

Peperomia nudinodis Trelease, sp. nov.—Herba majuscula patens truncicola, caule 2–4 mm. crasso, in sicco fusco, primo minute puberulo; folia ad nodum 3–5, inferne reducta vel caduca, rhombeo-ovata vel sublanceolata subacuta basi acuta, 10–15 cm. longa 8–10 cm. lata, coriacea, subtus pallidiora atque salienter 5-nervia, petiolo ca. 3 mm. longo; spicae numerosae axillares 50–70 mm. longae 1 mm. crassae, pedunculo 15–25 mm. longo.—Brisa de Zarcero, 2,300 meters, *Austin Smith H407* (type in Herb. Field Mus.).

Page 322. After *Peperomia pothifolia* insert:

Peperomia praecox Trelease, sp. nov.—Herba parva aberrans glabra, secus stolonem acaulescenti-caespitosa; folia elliptica breviter acuminata, basi rotundata vel obscure cordulata, 3–5 cm. longa, 2–2.5 cm. lata, e tertio infimo multiplinervia, valde coriacea, subtus purpurascentia, petiolo gracili ca. 2 cm. longo; spicae apice scapi 1-bracteati 3 cm. longi geminatae, in statu juvenili 20 mm. longae 1 mm. crassae.—Pejivalle, *M. Valerio A5* (type in Herb. Field Mus.). Obviously a reduced form of the caulescent series of *P. longebacca*.

Page 323. After *Peperomia queserana* insert:

Peperomia Quirosi Trelease, sp. nov.—Ut videtur herba parva adsurgens glabra monticola, caule gracillimo; folia alterna reniformi-cordata, apice rotundata vel obtuse protracta, 3–5 cm. longa atque aequilata, 7-nervia, in sicco tenuia pellucida, petiolo filiformi laminae aequilongo vel longiore; spicae terminales (vel sympodiales?) 60 mm. longae 3 mm. crassae, pedunculo brevissimo.—Carrillos de Poás, Prov. Alajuela, *M. Quirós 7* (type in Herb. Field Mus.).

Peperomia quotifolia Trelease, sp. nov.—Herba majuscula sed gracilis plus minusve caespitosa fere glabra truncicola, caule paullo ramoso 1–2 mm. crasso fuscescente; folia opposita vel ternata quadrato-ovata et utrinque obtusa vel magis elongata, apice protracta atque basi acuta, 2.5–3 cm. longa 1.5–2 cm. lata, subtus trinervia granulosa, petiolo 3 mm. longo; spicae axillares 50 mm. longae 2 mm. crassae, pedunculo 10–15 mm. longo.—Zarcero, 1,350 meters, *Austin Smith H272* (type in Herb. Field Mus.).

Page 325. After *Peperomia sessilifolioides* insert:

Peperomia setosispica Trelease, sp. nov.—Herba majuscula caespitosa subsimplex glabra, caule gracili; folia vulgo ternata vel quaternata lanceolata obtuse longiattenuata, basi acuta, 20–25 mm. longa 8 mm. lata, opaca crassa trinervia, petiolo 1–2 mm. longo; spicae terminales et ex axillis superioribus 20–60 mm. longae 2 mm. crassae ob pseudipedicellos squarrosis, pedunculo filiformi 15 mm. longo.—Canyon of Río Reventazón, near Santiago, 740 meters, *C. W. Dodge,* May 23, 1930 (type in Herb. Field Mus.).

Page 332. After *Piper auritum* insert:

Piper Austini Trelease, sp. nov.—Frutex 3-metralis laxe ramosus glaber, internodiis gracilibus breviusculis in sicco fuscescentibus; folia lanceolato-elliptica anguste acuminata, basi acuta latere altero paullo breviore, 12–16 cm. longa 4.5–6 cm. lata, e medio inferiore pinnatinervia, nervis 4+5, in sicco opaca, subtus paullo pallidiora, petiolo 10+2–3 mm. longo; spicae in sicco viso 40–60 mm. longae 3 mm. crassae subacutae, pedunculo 10 mm. longo; bracteae parvae subpeltatae undulato-zonatae.—Near Tapesco de Zarcero, 2,000 meters, *Austin Smith H435* (type in Herb. Field Mus.).

Piper Austini var. **aequilaterum** Trelease, var. nov.—Folia basi aequilateraliter subacuta, lanceolato-elongata, vix 14 cm. longa; spicae 75 mm. longae, pedunculo 15 mm. longo.—Zapote de San Carlos, 1,600 meters, *Austin Smith H860* (type in Herb. Field Mus.).

Page 353. After *Piper pentagonum* insert:

Piper percome Trelease, sp. nov.—Frutex nodosus ramosus glaber, internodiis floriferis gracilibus breviusculis; folia lanceolato-ovata sensim obtuso-acuminata, basi aequilateraliter rotundata, 8–13 cm. longa 3.5–5 cm. lata, e 2 tertiis inferioribus pinnatinervia, nervis 4–5×2, in sicco coriacea, petiolo 5–10 mm. longo; spicae 30 mm. longae 3 mm. crassae, pedunculo 5 mm. longo.—San Ramón, *Brenes 283* (type in Herb. Field Mus.).

Page 360. Before *Piper san-marcosanum* insert:

Piper san-luisense Trelease, sp. nov.—Frutex 4-metralis nervis foliorum subtus obscure subvelutinis exceptis glaber, internodiis brevibus crassiusculis; folia elliptica usque ovata subacuta, basi paullo inaequilateraliter rotundata vel inferiora subtruncata, 14–20 cm. longa 8–12 cm. lata, e medio inferiore multiplinervia, nervis 5×2, in sicco chartacea, petiolo 2 cm. longo; spicae 75–85 mm. longae 3–6 mm. crassae acutae, pedunculo ca. 5 mm. longo.—San Luis de Zarcero, 1,600 meters, *Austin Smith H573* (type in Herb. Field Mus.).

Before *Piper scalpens* insert:

Piper san-rafaelense Trelease, sp. nov.—Frutex, ramis crassis, internodiis brevibus rigido-villosis; folia elliptica acuta, basi valde inaequilateraliter auriculata, auricula altera obsoleta, altera petiolo longiore, 22 cm. longa et 11 cm. lata vel majora, e medio inferiore pinnatinervia, nervis 5×7, rugosa, nervis venisque subtus rigido-pilosis, petiolo 3 cm. longo piloso; spicae 300 mm. longae 10–15 mm. crassae, pedunculo crasso 3 cm. longo.—San Rafael de San Ramón, *Brenes 22019* (type in Herb. Field Mus.).

Page 365. After *Piper talamancanum* insert:

Piper tapantiense Trelease, sp. nov.—Frutex(?) nervis foliorum subtus subtomentulosis exceptis glaber, internodiis modice gracilibus atque elongatis; folia elliptica breviter acuminata basi aequilateraliter rotundata vel subcordulata, 15–18 cm. longa 8–10 cm. lata, e medio inferiore pinnatinervia, nervis 5×2, petiolo 1–2 cm. longo; spicae 25 mm. longae 4 mm. crassae acutatae, pedunculo 10–15 mm. longo; stigmata recurva, stylo brevi.—Tapantí, 1,300 meters, *Manuel Valerio 1607* (type in Herb. Field Mus.).

Page 368. After *Piper vallicolum* insert:

Piper varablancanum Trelease, sp. nov.—Frutex glaber 4.5 m. altus, internodiis floriferis breviusculis subgracilibus; folia lanceolata falcato-acuminata, ad basin inaequilaterali-acutam angustata, 20 cm. longa 6–7 cm. lata, e medio vel e 2 tertiis inferioribus pinnatinervia, nervis 5×2, chartacea, utrinque lucida, petiolo 1 cm. longo; spicae 90–100 mm. longae 3 mm. crassae obtusissimae, pedunculo 1.5 cm. longo; bracteae rotundato- vel transverso-subpeltatae, margine lato pallidiore lanato.—In forest, Vara Blanca de Sarapiquí, 1,500–1,750 meters, *Skutch 3205* (type in U. S. Nat. Herb.).

Page 370. After *Piper zacatense* insert:

Piper zarceroense Trelease, sp. nov.—Frutex glaber vix 2-metralis, internodiis floriferis breviusculis graciusculis; folia ovata acuminata basi subtruncate vel breviter cordata 16–19 cm. longa 11–12 cm. lata, e medio inferiore multiplinervia, nervis 5×2, in sicco subtenuia viridia, petiolo 5–6 mm. longo exalato; spicae 100 mm. longae atque 4 mm. crassae vel ultra, pedunculo 15 mm. longo.—Zarcero, 1,350 meters, *Austin Smith H49* (type in Herb. Field Mus.).

Page 392. Before *Trophis macrostachya* Donn. Smith insert:

Trophis chorizantha Standl. *Skutchia caudata* Pax & Hoffm. in Morton, Journ. Wash. Acad. Sci. 27: 307. 1937 (near El General, 950 meters, *Skutch 2383*). Honduras and British Honduras. A tree, up to 18 meters high; leaves short-petiolate, smooth to the touch, lanceolate to narrowly elliptic-oblong, abruptly falcate-acuminate, acute at the base, entire, glabrous; flower spikes much interrupted, the flowers few, distant.

Page 396. After *Pilea parietaria* insert:

Pilea phenacoides Killip, sp. nov.—Suffrutescens; stipulae persistentes; folia late ovata, abrupte caudato-acuminata, ad basin late cuneata, longipetiolata, grosse serrata, membranacea, plana, supra strigillosa, subtus glaberrima, nigropunctata, cystolithis linearibus; flores masculi in capitulis densis axillaribus sessilibus, perigonii segmentis in parte superiore subulatis.

Plant suffrutescent, up to 1.5 meters high, the stem erect, rather slender, mahogany-red, finely pilosulous, especially toward the apex; stipules ovate-lanceolate, about 5 mm. long and 3 mm. wide, acuminate, membranous, glabrous, bearing linear cystoliths on the outside, persistent; leaves of a node similar and subequal, broadly ovate, 7–10 cm. long, 3–6 cm. wide, abruptly caudate-acuminate, broadly cuneate at the base, long-petiolate (petioles 1.5–5 cm. long, slender, those of a node unequal), coarsely serrate except at the very base, triplinerved (lateral nerves arising very near the base and extending to the upper fifth of the blade), membranous, flat, the upper surface dark green, strigillose with rather numerous long, hyaline hairs and bearing slender, short, linear cystoliths, the under surface paler, glabrous, densely covered with slightly coarser and longer, linear cystoliths, and in addition black-punctate; plants dioecious, the staminate flowers in dense, sessile, axillary clusters 5–6 mm. wide, the perianth about 1.5 mm. in diameter, the segments with a long, filiform tip; pistillate inflorescence unknown.—Type in the U. S. National Herbarium, No. 1,745,449, collected in the vicinity of Zarcero, Costa Rica, at an altitude of about 1,400 meters, Sept. 22, 1937, *Austin Smith A443*. Duplicate in Herb. Field Mus. The general appearance of these herbarium specimens suggests *P. hyalina*, a low, annual, monoecious herb, with very different staminate flowers.

Page 408. After *Struthanthus polystachyus* insert:

OPILIACEAE

The family is represented in Central America by a single genus.

AGONANDRA Miers

At least one other species is known from Central America.

Agonandra obtusifolia Standl. Los Loros, Pacific coast, *Brenes 22481*. Mexico. A shrub or small tree with stout, pale branches; leaves alternate, short-petiolate, narrowly oblong to ovate, 2–5 cm. long, obtuse or subacute, entire, cuneate at the base, glabrous; flowers small, greenish, in bracteate, axillary racemes, dioecious; calyx minute, 4–5-lobate; staminate flowers with 4–5 narrow petals; stamens 4–5, exserted; pistillate flowers apetalous, with an urceolate disk surrounding the ovary; fruit fleshy, drupaceous, yellow, about 8 mm. long. The Costa Rican material is incomplete, and its determination somewhat questionable, at least as regards the species, but it is probably referable here.

Before *Heisteria* insert the following genus:

CHAUNOCHITON Benth.

Large trees; calyx small, 5-dentate, in fruit very greatly enlarged and rotate, thin; petals 5, very narrow, linear-spatulate, pilose within for almost their whole length; disk small; stamens 5, inserted opposite the petals and almost equaling them, the filaments filiform; anthers small, almost globose; ovary elongate, 2-celled; drupe more or less pentagonous, 1-celled.—The other species of the genus are South American.

Chaunochiton Kappleri (Sagot) Ducke. *Manglillo*. Valle del Hur, Río Diquís, 600 meters, *Tonduz & Pittier 11948*. Guianas and Amazonian Brazil. A tree of 12–15 meters, the trunk 20–25 cm. in diameter; leaves small, elliptic, short-petiolate, glabrous, acute or obtuse, obtuse or acute at the base and often short-decurrent; petals about 1 cm. long; fruiting calyx commonly 6–8 cm. broad, scarcely lobate. Dr. H. Sleumer has kindly supplied the writer with the data regarding the occurrence of this genus in Costa Rica.

Page 409. Before *Schoepfia vacciniiflora* insert:

Schoepfia Schreberi Gmel. Los Loros, Pacific coast, *Brenes 22482.* Mexico to West Indies and northern South America. A shrub or small tree; leaves petiolate, broadly ovate, obtuse or acute, mostly 2–3.5 cm. wide, bright green; flowers yellow or greenish, the perianth 4-parted, 4–5 mm. long, the lobes half as long as the tube or longer.

Page 412. **Aristolochia pilosa** HBK. Sometimes known by the name Canastilla.

Page 414. **Coccoloba floribunda.** Additional local names are Papaturro rastrero and Gateador.

Page 415. After *Polygonum acuminatum* insert:

Polygonum aviculare L. Tierra Blanca, *J. M. Orozco 302.* Doubtless introduced from Europe.

Page 421. After *Iresine angustifolia* insert:

Iresine arrecta Standl., sp. nov.—Frutex scandens usque 6 m. longus, caulibus crassiusculis plus minusve angulatis glabris vel tantum ad nodos compacte tomentosis, internodiis ut videtur valde elongatis, ramis angulo recto ut dicitur divergentibus; folia modica petiolata herbacea, petiolo gracili usque 3 cm. longo glabro vel glabrato; lamina oblongo-lanceolata 4.5–10 cm. longa 1.5–3.5 cm. lata longe sensim attenuato-acuminata, acumine ipso saepe obtuso vel anguste rotundato, basi rotundata vel truncata atque breviter abrupte decurrens, glabra, subtus paullo pallidior, flores ut videtur monoeci in spiculas dense multifloras 5–8 mm. longas ca. 5 mm. latas dispositi; spiculae sessiles vel breviter pedicellatae numerosissimae paniculam laxam ca. 30 cm. longam et 15 cm. latam nudam vel basi tantum foliosam efformantes; bracteae pallide brunnescentes hyalinae apiculatae late obtusae floribus paullo breviores; sepala floris feminei ca. 1.6 mm. longa viridescentia obtusa superne glabra basi dense lanuginosa leviter nervosa.—Zarcero, 1,650 meters, in semi-shade of forest, *Austin Smith H149* (type in Herb. Field Mus.). Also *No. 617* from the same locality.

Page 423. After *Pleuropetalum Sprucei* insert:

Pleuropetalum Standleyi Suessenguth, Repert. Sp. Nov. 44: 41. 1938. Tilarán, Guanacaste, 500–650 meters, *Standley & Valerio 44553.* Leaves ovate-lanceolate, about 9 cm. long and 3 cm. wide, acuminate, contracted to the petiole; inflorescences spikelike, many-flowered, the rachis zigzag, the flowers 3–5 mm. apart; sepals 3–4 mm. long, fuscous, striate.

Page 431. Before *Scleranthus* insert:

LYCHNIS L.

Lychnis Coronaria (L.) Desr. Cultivated for ornament in gardens at Zarcero, and also naturalized, *Austin Smith.* Native of Europe.

Page 438. Before *Hyperbaena panamensis* insert the following species:

Hyperbaena leptobotryosa (Donn. Smith) Standl. Field Mus. Bot. 18: 618. 1937. *Phyllanthus leptobotryosus* Donn. Smith, Bot. Gaz. 54: 241. 1912. *H. isophylla* Standl. Field Mus. Bot. 8: 12. 1930 (based upon the same collection as *H. leptobotryosa*). Santo Domingo de Golfo Dulce, Prov. Puntarenas, *Tonduz 7232* (Donnell Smith gives the number as *7332*). Also in Guatemala. Leaves petiolate, coriaceous, lustrous, elliptic-oblong or lance-oblong, 10–13 cm. long, acuminate, acute and often unequal at the base, entire, pinnate-nerved, the lateral nerves about 6 pairs, ascending at an acute angle; staminate panicles lax and many-flowered, the almost filiform branches puberulent, the flowers scarcely 1 mm. in diameter.

Page 446. After Myristicaceae insert: The American Myristicaceae have been monographed recently by A. C. Smith, Brittonia 2: 393. 1938.

Page 447. Before *Virola Koschnyi* insert:

Virola guatemalensis (Hemsl.) Warb. El Rosario de Orosi, 1,120 meters, *Pittier 16628.* Guatemala to Panama. A tree of 20 meters or more, the young branchlets ferruginous-tomentellous or cinereous-puberulent, soon glabrate; leaves oblong to elliptic-oblong, 13–25 cm. long, 4–8 cm. wide, acuminate or cuspidate, attenuate to broadly obtuse at the base, glabrous or nearly so, the lateral nerves 14–21 pairs; seeds 2–2.5 cm. long.

Page 452. Kostermans, who has recently monographed this group of Lauraceae, reduces *Misanteca* to synonymy under *Licaria* Aubl. *Misanteca Pittieri* and *M. costaricensis* he places as synonyms under **Licaria limbosa** (Ruiz & Pavón) Kostermans, Recueil Trav. Bot. Néerl. 34: 585. 1937. The species ranges from Costa Rica to Venezuela and Bolivia.

Page 452. After *Misanteca Pittieri* insert:

Licaria Cufodontisii Kostermans, Recueil Trav. Bot. Néerl. 34: 591. 1937. Península de Osa, near Puerto Jiménez, *Cufodontis 187.* A small tree, the branchlets glabrous; leaves elliptic, 8–12 cm. long, 3–4 cm. wide, caudate-acuminate, short-acute at the base, glabrous; panicles axillary and subterminal, lax, many-flowered, pyramidal, 5–11 cm. long, the flowers subumbellate, the glabrous pedicels 3–5 mm. long; flowers glabrous, 1.5 mm. long.

Page 457. After *Persea americana* insert:

Persea Austin-Smithii Standl., sp. nov.—Arbor, ramulis crassis nodosis dense foliatis angulatis vel sulcatis sat dense brunneo-tomentosis, internodiis brevissimis; folia inter minora petiolata rigide coriacea, petiolo crassissimo usque 1 cm. longo brunneo-tomentoso; lamina rotundato-ovalis vel suborbicularis 5.5–7 cm. longa 4.5–5 cm. lata apice late rotundata basi rotundata vel late rotundata, interdum breviter abrupte in petiolum contracta, supra brunneo-olivacea lucida fere glabra sed ut videtur in statu juvenili sparse tomentella, nervis obviis sed non elevatis, subtus glauca saltem ad costam nervosque laxe tomentosa, costa crassiuscula elevata, nervis lateralibus utroque latere 3–4 elevatis solemniter arcuatis, venulis ultimis minute reticulatis prominulis; paniculae axillares laxe vel dense multiflorae folia aequantes longipedunculatae breviter ramosae, ramis laxe sordido-tomentosis, pedicellis crassis brevibus tomentellis; perianthium 3 mm. longum extus brunneo-tomentellum, segmentis ovalibus obtusissimis subaequalibus; ovarium late ovoideum glabrum.—Palmira, Cantón de Alfaro Ruiz, Prov. Alajuela, April, 1937, *Austin Smith 4168* (type in Herb. Field Mus.). Regarding this tree, Mr. Smith supplies the following notes: Growing in a little swale at edge of forest, in sunny position and clay loam, east exposure; bark obscure gray, thick and corky; base of trunk 2 meters in diameter, the main trunk dead and broken off, two side trunks persisting, these 20 cm. in diameter; tree 9 meters high, the expanse the same; bud cluster yellowish; open flowers dull yellow-brown; leaves moderately lustrous on the upper surface. A rather rare but notable tree here.

Page 461. After *Hernandia sonora* insert the following species:

Hernandia stenura Standl., sp. nov.—Ramuli crassi plus minusve sulcati et obtuse angulati, primo dense minute adpresso-tomentulosi, internodiis brevibus; folia modica longipetiolata, petiolo gracili 5–6 cm. longo sparse puberulo-tomentello vel glabrato; lamina ovata vel ovato-elliptica 15–25 cm. longa 7–11.5 cm. lata, basi anguste rotundata, apice acuta vel acuminata atque in caudam 2–3.5 cm. longam linearem apice obtusam sensim protracta, supra glabra in sicco fusca, costa nervisque non elevatis, sublucida, subtus pallida ubique densissime minute verruculoso-papillosa, basi trinervia, costa elevata utroque latere nervos 4–5 graciles prominentes angulo semirecto adscendentes fere rectos emittente, venis prominulis remotis laxe reticulatis; bracteae obovato-oblongae utrinque dense cinereo-tomentellae ca. 9 mm. longae, 4 mm. latae, apice rotundatae; perianthii segmenta utrinque dense tomentella 5 mm. longa.—Cataratas de San Ramón, March–April, 1931, *Brenes 13655* (type in Herb. Field Mus.). The available material consists of numerous detached leaves and a few fragments of inflorescence, insufficient for a complete description. However, the leaf form is so striking, especially in the very long and narrow acumination, that there can be little doubt that the material represents a quite distinct species of *Hernandia.*

Page 465. **Nasturtium mexicanum.** O. E. Schulz (Repert. Sp. Nov. 34: 132–133. 1933) has recently discussed this species in a monographic account of the genus. He considers *N. plebejum* Polak. a distinct species, with a range from Mexico to Costa Rica. To *N. mexicanum* he assigns a similar range, and records it also from Costa Rica. In *N. mexicanum* the petals are shorter than the sepals; in *N. plebejum* they equal or exceed the sepals. There are also supposed differences in the number of ovules. Since the two forms have the same range, and are said to differ in such probably variable characters, it seems of very doubtful propriety to consider *N. plebejum* more than a form or variety of *N. mexicanum.*

Page 467. Before *Capparis discolor* insert:

Capparis Brenesii Standl., sp. nov.—Fruticosa omnino glabra, ramulis crassis plus minusve obtuse angulatis; folia majuscula

longipetiolata firme membranacea, petiolo gracili 6–9.5 cm. longo; lamina late elliptica vel late ovato-elliptica 11–16 cm. longa 6–11 cm. lata acuta vel abrupte breviter acuminata, basi acuta vel subacuta, subtus vix pallidior, nervis lateralibus utroque latere 6–7 subtus prominulis pallidis subarcuatis angulo semirecto adscendentibus; pedicelli crassiusculi adscendentes 4.5 cm. longi; sepala imbricata late ovata obtusa vel anguste rotundata 5–6 mm. lata viridescentia; gynophorium 2.5 cm. longum et ultra gracillimum; caetera ignota. —Entre San Pedro y San Francisco de San Ramón, February, 1932, *Brenes 15126* (type in Herb. Field Mus.). Known only from very incomplete material, but evidently distinct from the other species known from Costa Rica.

Page 468. **Capparis pseudocacao** Schum. The following collections probably are referable here: San Rafael de San Ramón, *Brenes 22002;* San Miguel de San Ramón, *Brenes 19154, 21921* (this number as regards fruit only). The species must be related to *C. discolor* Donn. Smith, but the material listed seems to be distinct in its larger and relatively broader leaves. Unfortunately, the flowers of the San Ramón plant are unknown. The fruits are remarkable for their large size, 10–11 cm. long and half as broad; they are dark brownish when dried, and filled with a great number of large seeds. Professor Brenes reports that they are edible, as stated originally by Wercklé. Most fruits of this genus certainly are far from being palatable to man.

Page 473. **Escallonia floribunda** HBK. Collected also on the summit of Volcán de Irazú, 3,450 meters, *Biolley 88.*

Page 498. After *Inga mollifolia* insert:

Inga Montealegrei Standl., sp. nov.—*Guabo salado.* Arbor, ramulis teretibus striato-sulcatis cinnamomeis, novellis pilis rigidis flavescentibus adscendentibus hispidulis; folia modica, petiolo nudo usque 3 cm. longo hispidulo, rhachi inter foliola anguste (ca. 5 mm. late) alata, glandulis magnis depressis crateriformibus; foliola plerumque 4-juga brevissime petiolulata coriacea lanceolato-oblonga plerumque 6–15 cm. longa atque 2.5–6 cm. lata, sensim acuminata, basi cuneato-obtusa usque oblique rotundata vel obscure cordata, supra pallida lucida, ad costam nervosque strigosa, aliter glabra, costa elevata gracili, nervis prominulis, subtus fere concoloria fere ubique pilis rigidulis flavescentibus vix adpressis interdum subpatentibus hispidula; flores ut videtur spicati, non visi; legumen

anguste oblongum compressum 10–14 cm. longum 4–5 cm. latum, basi oblique rotundatum vel truncatum, apice oblique late rotundatum vel subemarginatum, pilis sparsis longis patentibus hispidohirsutum, marginibus obtusis paullo incrassatis; semina ca. 12.—Cultivated in Finca Las Pavas, May, 1938, *Mariano Montealegre 1* (type in Herb. Field Mus.). The fact that the tree from which the type material was taken is in cultivation makes it uncertain that it is a native of Costa Rica. At least, I have been unable to match the type with any of the *Inga* species known from Central America and Mexico.

Page 503. **Mimosa invisa** Mart. Another local name is Raspa-canilla.

Page 505. Under *Pentaclethra macroloba,* the last sentence should read: Pittier states that the presence of this tree is considered an indication that land is of little value for agriculture.

Page 526. *Calopogonium ferrugineum* Piper should be referred to synonymy under *Pachyrhizus erosus* (L.) Urban (see page 549), according to information kindly supplied to the writer by Dr. H. Harms.

Page 530. The proper name for the species listed as *Crotalaria guatemalensis* Benth. is **Crotalaria vitellina** Ker, according to recent determinations by Dr. H. A. Senn. *C. guatemalensis* and *C. Carmioli* are synonyms of *C. vitellina.*

Page 542. *Leycephyllum* Piper is a synonym of *Rhynchosia* (see page 554), according to information supplied in a letter by Dr. H. Harms. *L. micranthum* is synonymous with *Rhynchosia pyramidalis* (Lam.) Urban (page 555), or very close to that species.

Page 547. Before *Medicago sativa* insert the two following species:

Medicago arabica (L.) All. La Cañada, *J. M. Orozco 148a.* Cultivated as a forage plant, and also naturalized. Native of Europe. Plants procumbent, with elongate, branched stems, sparsely pubescent or almost glabrous; leaflets broadly obovate, mostly 2–2.5 cm. long, with a dark spot on the upper surface, denticulate; peduncles few-flowered, the flowers small and inconspicuous; fruit spirally coiled, the margins covered with prickles, the edge of the pod furrowed between the prickles.

Medicago hispida Gaertn. var. **denticulata** (Willd.) Burnat. La Cañada, *J. M. Orozco 148b.* Cultivated for forage and also naturalized. Native of Europe. Similar to *M. arabica,* the leaflets smaller, not spotted on the upper surface; fruit smaller, the edge of the pod not furrowed between the prickles.

Page 548. After *Myrospermum frutescens* insert:

MYROXYLON L.

The genus is represented in North America by a single species.

Myroxylon balsamum (L.) Harms, var. **Pereirae** (Royle) Harms. *Bálsamo, Chirraca.* Orotina, cultivated, *J. M. Orozco 135.* Said to grow wild in Guanacaste and in southern Costa Rica. The variety is widely distributed in Central America, and the typical form of the species has a wide distribution in South America. A tall tree, with a small crown, the bark smooth and pale; leaves pinnate, the 7–11 leaflets with large, translucent oil glands; flowers small, whitish, racemose; fruit samaroid, 7 cm. long, 2–3 cm. wide, the apical portion thick, 1-seeded, the basal portion long and broadly winged. This tree is the source of the celebrated balsam of Peru, which comes wholly or chiefly from a limited area along the coast of Salvador. This balsam is a fragrant, aromatic liquid that has various applications in industry, and is an official drug of the United States Pharmacopoeia. The wood is of excellent quality, and is said to be valued in Costa Rica for various purposes.

Page 598. **Acalypha arvensis** Poepp. & Endl. A local name is Chimbombo.

Page 605. **Croton decalobus** Muell. Arg. Linnaea 34: 80. 1865–66. This name should be inserted in place of *C. Pittieri* Pax, which becomes a synonym of *C. decalobus.* The locality for *C. decalobus* was given as "Guatemala," on account of the misleading labeling of the original material, collected by Friedrichsthal. A specimen of the type material in the Herbarium of Field Museum is labeled as from Cartago, Costa Rica.

Page 617. Before *Pedilanthus* insert the following genus:

OPHELLANTHA Standl.

The genus consists of a single species.

Ophellantha spinosa Standl. Peñón de Los Loros, Pacific coast, *Brenes 22679.* Extending to Salvador and southern Mexico. A small tree, almost glabrous but with a few simple hairs; branches often bearing stipular spines 3–5 mm. long; leaves alternate or fasciculate, slender-petiolate, elliptic or ovate-elliptic, 5–9 cm. long, acute or acuminate, acute and decurrent at the base, paler beneath, entire; flowers monoecious, long-pedicellate, solitary or fasciculate on axillary spurs; staminate petals green, 5 mm. long, rounded at the apex, glabrous, ciliolate; pistillate sepals oblong-elliptic, in fruit 1.5 cm. long, obtuse or subacute, denticulate, 5-nerved; capsule 2-celled, 1.5 cm. long.

Page 618. The reference to *Phyllanthus micrandrus* should be deleted. The material referred to this species, as indicated by further study, is really referable to *Phyllanthus Pittieri* Pax.

Page 621. Before *Tetrorchidium rotundatum* insert:

Tetrorchidium euryphyllum Standl. Cataratas de San Ramón, *Brenes 13486.* Panama. A tree of about 9 meters, the trunk 10 cm. in diameter, the branchlets strigillose; leaves petiolate, the petiole biglandular beneath at the apex; blades elliptic or broadly elliptic, 15–25 cm. long, obtuse or rounded and abruptly short-acuminate at the apex, obtuse and short-decurrent at the base, remotely and obscurely denticulate, sparsely and minutely strigillose above, strigillose beneath, the lateral nerves about 6 pairs; pistillate flowers racemose, the racemes axillary, geminate or solitary, 3.5–6 cm. long, the rachis fulvous-strigose, the pedicels 1–2.5 mm. long.

Page 627. In place of *Rhus costaricensis* substitute the following name: **Rhus terebinthifolia** Schlecht. & Cham. var. **pilosissima** Loes. Of this *R. costaricensis* is a synonym. In his recent monograph of *Rhus* (Ann. Mo. Bot. Gard. 24: 351–354. 1937) Barkley treats *R. costaricensis* as distinct. He also reports *R. terebinthifolia*, which extends to Mexico, from Costa Rica. Of the latter he cites two collections by the present writer, which are not now available for examination. They come from the region of Cartago, where Barkley reports also *R. costaricensis.* It is hard to conceive of the existence at

Cartago of two closely related species of this genus, which is so poorly represented in Central America by species and individuals. Examination of the available material of *R. terebinthifolia* and *R. costaricensis* convinces me that the latter is better considered as a variety—a rather weak one—as it was treated by Loesener.

Page 633. After *Microtropis occidentalis* insert:

Microtropis Standleyi Lundell, Bull. Torrey Club 65: 463. 1938. Cerros de Zurquí, northeast of San Isidro, Prov. Heredia, 2,000–2,400 meters, *Standley & Valerio 50602.* Endemic, and known only from the region of the type. An epiphytic shrub about 2 meters long; leaves petiolate, lance-elliptic or oblong-elliptic, 5.5–9.5 cm. long, short-acuminate, cuneate or subacute at the base; cymes 2.5 cm. long or less, the stout peduncles 3.5–7.5 mm. long.

Page 634. In place of *Zinowiewia integerrima* substitute: **Zinowiewia costaricensis** Lundell, Bull. Torrey Club 65: 471. 1938. Cuesta de Tarrazú, 1,900 meters, *Tonduz 7861.* Collected also on Cerros de Candelaria by Oersted. Panama. *Z. integerrima* occurs in Guatemala and Mexico.

Page 641. Before *Paullinia bracteosa* insert:

Paullinia Austin-Smithii Standl., sp. nov.—Frutex scandens, ramis gracilibus trisulcatis atque obtuse trigonis; folia trifoliolata longipetiolata crasse membranacea, petiolo 3.5–5 cm. longo profunde sulcato puberulo vel fere glabro, petiolulis 7–9 mm. longis; foliola elliptica, lateralia paullo obliqua, 8–12 cm. longa 4.5–5.5 cm. lata abrupte breviter acuminata, basi acuta vel cuneato-acuminata, remote obscure serrulato-dentata vel fere integra, supra laete viridia lucida glabra, nervis venisque prominulis, subtus fere concoloria, ad costam nervosque sparse puberula vel fere glabra, nervis venisque prominentibus, venulis laxe reticulatis; paniculae racemiformes longi-pedunculatae multiflorae ca. 25 cm. longae, rhachi sparse puberula vel pilosula; fructus in calyce subsessilis glaber trialatus ambitu suborbicularis vel obcordato-orbicularis, 2.5–3 cm. longus et aequilatus, apice late rotundatus vel emarginatus, basi breviter late cuneato-angustatus, alis coriaceis eleganter elevato-venosis.—Zapote de San Carlos, March, 1938, 1,600 meters, *Austin Smith H539* (type in Herb. Field Mus.). "A vigorous climber at the edge of forest, supported on the limbs of trees; racemes pendent; fruit green on one side and russet-red on the other; leaves dark green and moderately shining above."

Page 661. After *Sloanea guapilensis* insert:

Sloanea hyptoides Standl., sp. nov.—Ramuli graciles obtuse angulati et striati densissime tomento ochraceo vel sordido adpresso induti, internodiis brevibus; folia inter minora firme membranacea, petiolo 1–2.8 cm. longo crasso dense tomentello; lamina elliptico-oblonga 7.5–13 cm. longa 3.5–6.5 cm. lata obtusa atque apiculata vel subacuta, basi late rotundata usque cuneato-decurrens, supra in sicco brunnescens vel fusca, tantum ad costam tomentella, opaca, nervis non elevatis, subtus paullo pallidior, ad nervos costamque pilosula et puberula, aliter glabra vel sparse hinc inde puberula, costa crassiuscula elevata, nervis lateralibus utroque latere ca. 10 teneris prominentibus subarcuatis obliquis, nervulis ultimis prominulis arctissime reticulatis; flores axillares solitarii vel in cymulas 3–5-floras laxas longipedunculatas dispositi, pedicellis crassis usque 4 cm. longis dense tomentellis; sepala ca. 9 oblongo-lanceolata 9–14 mm. longa attenuato-acuminata utrinque dense tomentella; stamina numerosissima, antheris angustis 2 mm. longis.—Zarcero, Baja Vista Road, Prov. Alajuela, 2,010 meters, April, 1937, *Austin Smith 4121* (type in Herb. Field Mus.). "Growing on top of hill in semi-shaded, whitish clay loam; tree umbrella-like, 7.5–9 meters high, the trunk 30–60 cm. in diameter at the base; bark gray to clove-gray; sepals arranged in a starlike fashion, flat, etruscan red."

Page 671. After *Malvaviscus spathulatus* insert the following genus:

MODIOLA Moench

A single species is found in Central America.

Modiola caroliniana (L.) Don. Laguna de Zarcero, 600 meters, *Austin Smith P.C. 275.* Widely distributed in tropical and even temperate America. Stems branched, decumbent, green, sparsely stellate-pubescent; leaves long-petiolate, rounded in outline, 1.5–3.5 cm. wide, pedately 3–5-lobate, the lobes dentate or incised; flowers small, solitary in the leaf axils, 6–10 mm. broad, long-pedunculate, brick-red; fruit depressed, the carpels 15–20, septate between the seeds, dehiscent, hispid-aristate dorsally. The plant probably is an introduction in Costa Rica.

Page 677. **Wercklea insignis** Pittier & Standl. Mr. C. H. Lankester writes that he has seen this species on one of the streams tributary to the Pejivalle, only a few miles from the farm of the United Fruit Company; also that one of the best displays of the tree is in the steep valley of La Paz, on the Sarapiquí road.

Wercklea lutea Rolfe. Mr. Lankester reports that he found this tree in flower in the Rivas Valley, where it joins the Buena Vista.

Page 717. Before *Banara guianensis* insert:

Banara costaricensis (Standl.) Sleumer, Notizbl. Bot. Gart. Berlin 14: 48. 1938. *Hasseltia costaricensis* Standl. (see page 720 of the present volume).

Page 725. To **Xylosma Seemannii** add the following: An apparent synonym of this species is *Myrsine serrata* Oerst. Vid. Medd. Kjoebenhavn 1861: 134. 1862, based on *Oersted 596* from Lago del Reventado, and reported with the vernacular name Ratón cimarrón. A specimen of this collection is in the Herbarium of Field Museum. It is sterile, and Oersted reports that he had but one flower. Mez, in his monograph of Myrsinaceae in the *Pflanzenreich,* referred the plant doubtfully to the Symplocaceae, but there is no doubt as to its proper reference rather to the Flacourtiaceae, where it seems to be merely a narrow-leaved form of *Xylosma Seemannii.* Both species names involved were published in 1862, apparently, and I have not attempted to determine which has priority, because the specific name *serratum* already has been used in *Xylosma.*

Page 757. Before *Rhipsalis Cassutha* insert:

Rhipsalis acuminata (Cufodontis) Standl., comb. nov. *Pseudorhipsalis acuminata* Cufodontis, Archivio Bot. 9: 196. 1933. Near La Castilla–Los Loros, 15 km. from the mouth of Río Reventazón, *Cufodontis 494.* Known only from the original material. Plants pendent, the branches thin, lanceolate, very long-acuminate, crenate, 15–35 cm. long, 2–6 cm. wide; areoles sparsely white-pilose, 1–1.5 cm. apart; flowers 10–15 mm. long, the segments pink, suberect or campanulate-divergent, obtuse, connate at the base into a tube 3 mm. long; fruit subglobose, 8 mm. in diameter, red.

Page 762. After *Lagerstroemia indica* insert:

Lagerstroemia speciosa (L.) Pers. Planted for ornament about San José, and probably elsewhere. Native of the East Indies. A shrub or small tree; leaves elliptic, 8–10 cm. long; flowers very showy, rose to purple, 5–8 cm. broad, arranged in dense panicles 20–30 cm. long; capsules 3–5 cm. long.

Page 769. **Terminalia chiriquensis** Pittier. Professor Brenes states that the name for this tree is Surá, not Surrá.

Page 771. Before *Eugenia cartagensis* insert the following new species:

Eugenia Austin-Smithii Standl., sp. nov.—Arbor, ramulis gracilibus ad nodos subincrassatis glabris, internodiis brevibus; folia inter minora breviter petiolata subcoriacea, petiolo crassiusculo superne marginato 5–8 mm. longo glabro; lamina elliptico-oblonga 5–7 cm. longa 2–3 cm. lata subabrupte caudato-acuminata, acumine oblongo-lineari obtuso, basi acuta, supra lucida olivacea glabra, costa impressa, nervis vix elevatis, subtus pallidior lutescens glabra, costa crassiuscula prominente, nervis lateralibus utroque latere ca. 14 tenerrimis fere rectis prope marginem nervum tenerum intramarginalem efformantibus, venulis obscuris; flores ad nodos aggregati 2–5 e quaque axilla nascentes, pedicellis crassiusculis rectis 5–7 mm. longis sparse pilis minutis adscendentibus indutis, bracteolis apicalibus vix 1 mm. longis late ovatis obtusis ciliolatis; calycis tubus late obconicus 2–2.5 mm. longus sparsissime minute pilosulus vel fere omnino glaber, sepalis orbicularibus late imbricatis 6 mm. longis; petala ciliata ca. 8 mm. longa late ovalia; fructus (immaturus) sectione anguste oblongus 1.5 cm. longus 5–6 mm. crassus.—Llanura Bonita de Zarcero, Prov. Alajuela, 1,600 meters, April, 1938, *Austin Smith H605* (type in Herb. Field Mus.). La Palma de San Ramón, March, 1935, *Brenes 20458* (in fruit). "A tree on dry hillside woodland, where it is gregarious, 6 meters high, of rather compact growth, the trunk 13 cm. in diameter at the base; bark dark gray, slightly roughened, the cambium layer light brown; leaves slightly stiff, shining, pale on the under side; flowers pure white." (*Austin Smith.*)

Page 788. After *Blakea anomala* insert:

Blakea Austin-Smithii Standl., sp. nov.—Frutex vel arbuscula epiphytica, ramulis crassiusculis densissime pilis longis mollibus patentibus brunneis hirsutis, internodiis brevibus; folia modica breviter petiolata membranacea, petiolo crasso 1–2 cm. longo dense brunneo-hirsuto; lamina elliptica vel obovato-elliptica 6.5–10 cm. longa 3.5–5.5 cm. lata caudato-acuminata, basi acuta, basi ipsa laminae breviter utroque latere refracta atque sic subauriculata, supra in sicco fusco-viridis, in statu juvenili sat dense pilis longissimis mollibus pilosa, cito glabrata, nervis subimpressis, subtus brunnescens dense pilis longis brunneis patentibus hirsuta, trinervia, margine integro toto hyalino atque revoluto; flores axillares solitarii, pedunculo ca. 1.5 cm. longo dense brunneo-hirsuto; bracteae subaequales oblongo-lanceolatae ad lineari-lanceolatae 1.5–2 cm. longae longe attenuato-acuminatae dense breviter hirsutae, apicem versus serrulatae; calycis tubus globosus 7 mm. longus pilis sparsis brevibus hispidulis pilosus, lobis ca. 8 mm. longis e basi ovata abrupte caudato-attenuatis.—Palmira, Prov. Alajuela, 2,200 meters, March, 1938, *Austin Smith H382.* "Epiphytic, growing to treelike dimensions, and sometimes supplanting its host; leaves with incurved lateral margins, the ribbing and venation prominent." The very thin and incurved margins of the leaves suggest the indusia of some ferns with linear, marginal sori.

Page 847. **Jussiaea geminiflora** Donn. Smith. Another local name is Canario.

Page 849. After *Oenothera cuprea* insert:

Oenothera laciniata Hill. Zarcero, *Austin Smith A64.* Eastern United States to Ecuador. Plants annual or perennial, prostrate or decumbent, branched, pubescent or strigose and sparsely long-villous; leaves deeply pinnatifid or merely dentate, those of the stem sessile; flowers solitary and sessile in the axils of the upper leaves; calyx tube 1.5–5 cm. long, the lobes (in the Costa Rican form) about 1 cm. long; petals yellow, 1 cm. long or larger; capsule sessile, slender, cylindric, 1–3.5 cm. long, only 2–3 mm. thick. The Costa Rican plant seems to belong to the typical form of the species, and is presumably an introduction.

Page 855. After *Oreopanax capitatum* insert:

Oreopanax costaricense March. Bull. Acad. Belg. II. 47: 89. 1879. Volcán de Irazú, 2,700 meters, *Oersted.* Infrequent in the mountains, at 1,500–2,700 meters. Panama. A tree of 10 meters, glabrous throughout; petioles 7–15 cm. long, the blades elliptic or obovate-elliptic, rounded at the apex, attenuate or acute at the base, entire; inflorescence 5–6-branched from the base, the heads 12–15-flowered.

Page 857. Before *Sciodaphyllum robustum,* insert the following new species:

Sciodaphyllum chartaceum A. C. Smith, sp. nov.—Frutex(?) maturitate ubique glaber; ramulis teretibus; petiolis 2.5–8 cm. longis, ligula coriacea oblongo-lanceolata 1.5–2.5 cm. longa decidua, foliolis ut videtur 5 (foliis perfectis non visis), petiolulis gracilibus 1–4 cm. longis, laminis chartaceis oblongis vel oblongo-ovatis vel oblongo-lanceolatis, 10–18 cm. longis, 4.5–9 cm. latis, basi acutis vel obtusis, apice caudato-acuminatis (acumine acuto 1–2 cm. longo), margine integris, costa subtus prominente, nervis secundariis utroque 7–13 arcuatis, utrinque elevatis; inflorescentia ut videtur anguste paniculata (perfecta non visa), 15–20 cm. longa, ubique juventute laxe pallide puberula mox glabra, pedunculis gracilibus 2–10 mm. longis, pedicellis 3–6 per umbellam 1–3 mm. longis; floribus 4- vel 5-meris, calyce cupuliformi, sub anthesi limbo brevi denticulato incluso 1–1.5 mm. longo, ca. 1 mm. diametro; petalis membranaceis connatis deltoideis 1.5 mm. longis fusco-lineolatis; filamentis brevibus, antheris deltoideis 1–1.2 mm. longis; stylis 4 vel 5, liberis vel basi cohaerentibus; fructibus angulatis 3–4 mm. diametro, stylopodio coriaceo stylis conspicue recurvatis coronato, seminibus plerumque 4 vel 5.—Cataratas de San Ramón, March–April, 1931, *Brenes 13643* (type in Herb. Field Mus.); Feb., 1931, *Brenes 13449*. Although the available material is very incomplete, it seems advisable to describe a species which is very distinct from others of Central America. Its nearest ally appears to be *Schefflera Pittieri* Harms (the use of *Sciodaphyllum* rather than *Schefflera* has been discussed in Brittonia 2: 254. 1936) of Venezuela, a species with conspicuously longer peduncles, petioles, and pedicels, and with 6–8 styles.

Page 859. Before *Coriandrum* insert:

CONIUM L. Poison hemlock

Conium maculatum L. Naturalized near San José, *J. M. Orozco 321*. Native of Europe. A poisonous plant.

Page 871. After *Cavendishia complectens* insert:

Cavendishia confertiflora A. C. Smith, Phytologia 1: 210. 1937. Vicinity of El General, Prov. San José, 1,560 meters, *Skutch 2991*. Leaves short-petiolate, thin-coriaceous or chartaceous, oblong or oblong-elliptic, 12–16 cm. long, acuminate, rounded or subcordate at the base, 5-plinerved; inflorescences racemose, 15–25-flowered, glabrous; bracts suborbicular or broadly obovate, 10–12 mm. long; pedicels 4 mm. long or less; calyx lobes oblong, obscurely glandular-ciliate, 4–5 mm. long; corolla cylindric-urceolate, 16 mm. long, 6–7 mm. in diameter.

Page 873. After *Cavendishia Quereme* insert:

Cavendishia Skutchii Morton, Journ. Wash. Acad. Sci. 27: 308. 1937. Vicinity of El General, Prov. San José, 1,100 meters, *Skutch 2802.* Known only from the original material. Leaves thin-coriaceous, metallic-bluish when dried, oblong, 10–15 cm. long, obtuse or shortly obtuse-acuminate, subcordate or subtruncate at the base, glabrous above, sparsely brown-pilose beneath, 5-plinerved; inflorescences subglabrous, the rachis 5–7 cm. long; corolla pink in the middle, white at the base and apex, 13–15 mm. long.

Page 893. After *Ardisia revoluta* insert:

Ardisia Skutchii Morton, Journ. Wash. Acad. Sci. 27: 309. 1937. Vicinity of El General, Prov. San José, 1,070 meters, *Skutch 2660.* Known only from the original material. A tree of 7.5 meters, the branches glabrous; leaves subsessile, oblanceolate, up to 26 cm. long and 7 cm. wide, acuminate, long-attenuate to the base, papyraceous, entire, glabrous, the nerves about 12 pairs; inflorescence white, 10 cm. long and 12 cm. wide, the bracts obovate, 2.5 cm. long, the flowers corymbose, the pedicels 12–15 mm. long; sepals white, 5.5 mm. long, rounded at the apex, lineate; corolla white, tinged with pink, 15 mm. broad; ovary glabrous.

Page 916. Before *Symplocos Brenesii* insert:

Symplocos Bradei Brand ex Sleumer, Repert. Sp. Nov. 42: 263. 1937. Western slope of Irazú, 1,800 meters, *A. C. Brade 2018.* A tree, the branchlets glabrous; leaves on petioles 1 cm. long, the blades oblong or narrowly oblong, 9–13 cm. long, 3–5 cm. wide, gradually acuminate, attenuate to the base, chartaceous, glabrous above, beneath laxly substrigose-pilose, the margin closely and regularly serrate, the lateral nerves 8–10; flowers in fascicles of 7–9, pink, fragrant, the pedicels obsolete; calyx lobes rounded-ovate, white-sericeous-tomentose outside, glabrous within, ciliate; corolla 14 mm. long, the lobes 4–5 mm. wide, glabrous inside, sericeous dorsally; ovary densely fuscous-tomentose.

Page 919. After *Ligustrum vulgare* insert the following genus:

LINOCIERA Swartz

Trees or shrubs, the leaves entire; flowers white or whitish, bracteolate, usually paniculate; calyx small, 4-cleft or 4-dentate; petals 4, distinct or nearly so, usually linear; stamens 2, inserted at the base of the petals, the filaments short, the anthers ovate to linear; ovary 2-celled, with 2 ovules in each cell; style short, the stigma oblong to globose; fruit a small, oblong drupe with thin flesh and a bony endocarp.—Two other species are known from northern Central America.

Linociera panamensis Standl. Entre Pata de Gallo y Santiago de San Ramón, *Brenes 6649*. Panama. A tree of 12–15 meters, the trunk 30–40 cm. in diameter, glabrous throughout; leaves slender-petiolate, obovate-oblong or elliptic-oblong, mostly 8–15 cm. long, abruptly obtuse-acuminate, acute or acuminate at the base, often contracted and long-decurrent; inflorescences cymose-paniculate, mostly shorter than the leaves, the pedicels in fruit 4–9 mm. long; petals about 7 mm. long; drupes white, compressed, 2 cm. long, 1 cm. broad.

Page 927. Before *Leiphaimos simplex* insert the three following species:

Leiphaimos costaricensis Standl. Contr. U. S. Nat. Herb. 17: 433. 1914. Helechales del General, Diquís Valley, 700 meters, *Pittier 12010*. Known only from the original collection. Stems simple, 7–13 cm. high, 1-flowered; cauline scales 4–5 pairs, 5–6 mm. long, distant, connate one-third their length, acute and subulate-tipped; calyx subtended by a pair of scales similar to the cauline ones, or the flowers short-pedunculate; calyx 7 mm. long, cleft one-third its length, the lobes oblong-linear to narrowly triangular, acuminate; corolla yellow, the tube 3.5–4.5 cm. long, slightly dilated in the throat, the lobes elliptic or elliptic-lanceolate, 10–12 mm. long, acuminate.

Leiphaimos Kupperi Suessenguth, Repert. Sp. Nov. 42: 46. 1937. Siquirres, 300 meters, *W. Kupper* in 1932. Stems 1-flowered or rarely 2-flowered, 7–10 cm. high; cauline scales lanceolate, distinct, 3 mm. long; bractlets 2, minute; calyx 5–7 mm. long, the teeth short, subobtuse; corolla orange, the tube 1 cm. long, the lobes linear, acute, 5 mm. long.

Leiphaimos lutea Morton, Journ. Wash. Acad. Sci. 27: 310. 1937. Near El General, Prov. San José, 1,130 meters, *Skutch 2767*. Plants white or yellowish, the stems 10–20 cm. high, 1-flowered; bracts 7–16 pairs, lanceolate, 6.5 mm. long, connate almost half their length; calyx ebracteate, the tube 5 mm. long, the lobes lanceolate, 2.7 mm. long, acute; corolla yellow, the tube 32–36 mm. long, inflated at base and apex, the lobes broadly ovate, 6–9 mm. long, oblique, cuspidate.

Page 930. To the reference under Apocynaceae, add: Woodson, N. Amer. Fl. 29: 103–192. 1938.

Page 941. *Rauwolfia canescens* L. is a synonym of **Rauwolfia hirsuta** Jacq., the latter being the proper name for the Costa Rican plant.

Page 947. The proper citation for *Thevetia peruviana* is **Thevetia peruviana** (Pers.) Schumann.

Page 948. *Tonduzia parvifolia* is a synonym of **Tonduzia longifolia** (A. DC.) Woodson.

Page 961. The species of *Cuscuta* are sometimes known in Costa Rica by the name Cabellos de ángel.

Page 964. After *Ipomoea Amparoana* insert the following species:

Ipomoea Austin-Smithii Standl., sp. nov.—*Pudreoreja.* Herba gracillima volubilis, caulibus glabris, internodiis elongatis; folia longipetiolata membranacea, petiolo gracillimo vulgo 2–4 cm. longo glabro vel saepius sparse breviter patenti-piloso; lamina subanguste cordato-ovata integra 4.5–8 cm. longa 2.5–4.5 cm. lata longe anguste attenuato-acuminata, basi sat profunde cordata, sinu aperto, supra viridis glabra vel ad venas minutissime puberula, subtus paullo pallidior, prope basin sparse pilis longis patentibus pilosa; pedunculi gracillimi axillares vulgo foliis paullo breviores cymose 1–3-flori, glabri vel puberuli vel breviter pilosi, pedicellis usque 1 cm. longis paullo incrassatis; sepala in statu florifero 4 mm. longa, in statu fructifero vix longiora, ovalia vel ovali-ovata obtusissima mutica, crasso-herbacea, pallido-marginata, costa carnosa incrassata et saltem in sicco rugoso-undulata, glabra; corolla alba 2 cm. longa, tubo gracili supra vix dilatato, extus glabra; capsula conico-ovoidea 1 cm. longa 5 mm. basi lata, apicem acutum versus angustata, 2-locularis; semina 4 ferrugineo-fusca ca. 5 mm. longa, fere ubique subdense breviter pubescentia.—San Ramón, January, 1933, *Brenes 16899* (type in Herb. Field Mus.); January, 1932, *Brenes 14933.* Piedades de San Ramón, 1,025 meters, *Brenes 5302.* Entre el Cementerio Calvo y el Río María Aguilar, near San José, 1,140 meters, *F. Solís 410.* San Luis de Zarcero, 1,300 meters, *Austin Smith P.C.109.* On page 969 material of this species was included in error under *I. tricolor* Cav., with which the present plant has little in common except a certain superficial resemblance. Actually it is closely related to *I. cardiophylla* Gray, of Mexico and Texas.

Page 1017. Another local name for *Hyptis capitata* is Botón negro.

Page 1042. Before *Capsicum macranthum* insert the following new species:

Capsicum isothrix Standl., sp. nov.—Herba metralis ut videtur laxa, ramis crassiusculis succulentis pilis brevibus patentibus ochraceis mollibus sat dense villosulis, internodiis valde elongatis; folia opposita vel solitaria laxe membranacea longipetiolata viridia, petiolo 2–7.5 cm. longo ut caule villosulo; lamina late elliptica vel elliptico-ovata 9–15 cm. longa 5–7.5 cm. lata subsensim longiacuminata, basi plus minusve inaequali rotundata vel obtusissima, integra vel subundulata, supra ubique sat dense pilis paucicellularibus laxis subadpressis (in statu sicco) villosa, subtus concolor dense breviter villosa, nervis obliquis angulo semirecto adscendentibus; flores in axillis fasciculati numerosi usque 16 vel ultra, pedicellis gracillimis valde inaequalibus usque 15 mm. longis pilis mollibus ochraceis inaequalibus villosulis; calyx late campanulatus truncatus 1.5 mm. longus ubique sat dense villosulus; corollae tubus 3 mm. longus extus glaber fauce ca. 3 mm. latus, lobis patentibus 5–6 mm. longis triangulari-oblongis intus glabris extus dense minute tomentulosis; antherae ovato-oblongae 2 mm. longae vel paullo ultra; fructus juvenilis glaberrimus.—Zarcero, 1,410 meters, August 25, 1937, *Austin Smith A245* (type in Herb. Field Mus.). "Growing in semishade near stream. Corolla with recurved lobes, in this position 12 mm. across the flower; color oil yellow with faint dotting of green; anthers creamy white. Leaves soft and velvety. Joints of the stem dull purplish violet." Related to *C. fuscoviolaceum* (Cufodontis) Morton & Standl. and *C. macranthum* Standl. & Morton, but differing from both in flower details and in the amount and quality of the pubescence.

Page 1061. After *Lycianthes multiflora* insert the following new species:

Lycianthes oligantha Standl., sp. nov.—Frutex 2-metralis fere ubique praeter flores glaber, partibus novellis interdum pilis paucis subadpressis brevibus indutis, ramis vetustioribus ochraceis, novellis viridibus vel pallidis teretibus vel subangulatis, internodiis plerumque elongatis; folia paris valde inaequalia membranacea magna vel majuscula breviter petiolata, petiolo crassiusculo usque 15 mm. longo; lamina foliorum majorum lanceolato-oblonga vel oblanceolato-oblonga 12–20 cm. longa 4.5–8 cm. lata sensim longiacuminata vel saepius longe caudato-acuminata, acumine angusto attenuato interdum fere lineari, basi interdum valde obliqua cuneata vel attenuata, supra intense viridis laevis, nervis lateralibus utroque latere ca. 11 arcuatis teneris angulo lato adscendentibus; lamina foliorum minorum breviter petiolata ovata, late elliptica, vel suborbicularis usque 6 cm. longa sed vulgo multo brevior, basi cuneata, apice obtusa usque rotundata, saepe apiculata; flores umbellati pauci, 1–4, pedicellis in statu fructifero usque 2 cm. longis atque incrassatis, in statu florifero gracilioribus atque vix ultra 6 mm. longis; calyx campanulatus 3 mm. longus truncatus glaber vel pilis paucis sparsis patentibus subhirsutus; corolla extus glabra, tubo e calyce vix exserto, lobis 7–10 mm. longis oblongo-triangularibus; fructus globosus 1 cm. diam. glaber.—Zarcero, 1,350 meters, in cloud forest, November 18, 1937, *Austin Smith A599* (type in Herb. Field Mus.); also *A570, A33.* La Peña de Zarcero, 1,375 meters, *Austin Smith H1217.* Palmira, 1,800 meters, *Austin Smith A481.* "A shrub, often with many straggling stems, growing in rich loam in deep forest shade. Leaves neutral green, dull. Twigs pale brown. Corolla pale greenish yellow."

Page 1087. Before *Solanum muricatum* insert the following new species:

Solanum Mortonianum Standl., sp. nov.—Arbuscula 3.5 m. alta, ramis gracilibus interdum subgeniculatis angulatis vel subteretibus brunnescentibus rimulosis glabris, internodiis plerumque brevibus; folia solitaria vel geminata, paris valde inaequalia, firme membranacea, breviter petiolata, petiolo crasso 4–8 mm. longo glabro; lamina foliorum majorum oblonga vel oblanceolato-oblonga solemniter asymmetrica 10–14 cm. longa 3–5.5 cm. lata caudato-acuminata vel subsensim attenuato-acuminata, acumine angusto attenuato, basi valde obliqua cuneato-acuta, supra laete viridis glabra ubique minute papillosa, subtus paullo pallidior ubique pilis teneris albis patentibus vel curvis dense submolliter pilosa, nervis lateralibus utroque latere ca. 10 teneris arcuatis angulo lato divergentibus; lamina foliorum minorum eae majorum similis sed parva, non ultra 2 cm. longa, interdum latior; inflorescentiae oppositifoliae laxae racemiformes ca. 15-florae graciliter longipedunculatae, pedicellis gracilibus glabris usque 13 mm. longis; calyx campanulatus 3.5 mm. longus basi paullo angustatus glaber minute papillosus, margine ciliolato brevissime lobato, lobis multo longioribus quam latis late rotundatis; corolla extus glabra 14 mm. longa, tubo calyce vix lon-

giore, lobis lineari-lanceolatis attenuatis; antherae anguste oblongae exsertae 3 mm. longae; bacca globosa 7 mm. diam. glabra.—Zarcero, 1,590 meters, November 20, 1937, *Austin Smith A615* (type in Herb. Field Mus.). "Trunk 7.5 cm. in diameter at the base; growing in semi-shade of woodland; bark pale brown, smooth; leaves soft, without luster. Flowers 5-parted, about 18 mm. broad, pale greenish yellow, the stamens ocher brown." In the key to the species of *Solanum* (page 1071), this plant runs at once to *S. incomptum* Bitter. That species differs in its much longer petioles, obtuse blades more or less pilose on the upper surface, and pilose pedicels.

Page 1093. *Solanum Seaforthianum* is known locally by the name Volcán.

Page 1104. A local name for *Capraria biflora* is Hierba de té.

TABULATION OF THE FAMILIES, GENERA, AND SPECIES OF COSTA RICAN PLANTS

Family	Genera	Species
Cycadaceae	2	2
Taxaceae	1	2
Coniferae	5	5
Typhaceae	1	1
Potamogetonaceae	2	2
Alismaceae	2	4
Butomaceae	1	1
Gramineae	96	283
Cyperaceae	17	122
Palmae	28	92
Araceae	20	121
Lemnaceae	2	2
Mayacaceae	1	1
Xyridaceae	1	2
Eriocaulaceae	4	4
Bromeliaceae	16	153
Commelinaceae	11	25
Pontederiaceae	3	5
Juncaceae	2	6
Liliaceae	15	18
Smilacaceae	1	13
Haemodoraceae	1	1
Amaryllidaceae	13	21
Dioscoreaceae	1	17
Iridaceae	9	13
Musaceae	3	20
Zingiberaceae	8	26
Cannaceae	1	5
Marantaceae	8	29
Burmanniaceae	4	4
Orchidaceae	122	955
Casuarinaceae	1	1
Piperaceae	2	537
Chloranthaceae	1	3
Lacistemaceae	1	1
Salicaceae	1	1
Myricaceae	1	3
Juglandaceae	2	2
Betulaceae	1	1
Fagaceae	2	17
Ulmaceae	4	4
Moraceae	17	62
Urticaceae	9	50
Proteaceae	3	5
Loranthaceae	13	39
Opiliaceae	1	1
Olacaceae	5	7
Balanophoraceae	3	3
Aristolochiaceae	1	14
Polygonaceae	7	20
Chenopodiaceae	3	3
Amaranthaceae	11	39
Nyctaginaceae	6	15
Batidaceae	1	1
Phytolaccaceae	5	8
Aizoaceae	4	4
Portulacaceae	4	5
Caryophyllaceae	7	14
Nymphaeaceae	2	3
Ceratophyllaceae	1	1
Ranunculaceae	5	8
Berberidaceae	2	2
Menispermaceae	2	10
Magnoliaceae	3	5
Annonaceae	9	28
Myristicaceae	4	7
Monimiaceae	2	12
Lauraceae	10	48

Family	Genera	Species
Hernandiaceae	2	4
Papaveraceae	4	4
Cruciferae	9	16
Tovariaceae	1	1
Capparidaceae	4	21
Resedaceae	1	1
Moringaceae	1	1
Crassulaceae	2	2
Podostemonaceae	3	4
Saxifragaceae	5	10
Brunelliaceae	1	1
Cunoniaceae	1	3
Rosaceae	17	40
Connaraceae	3	4
Krameriaceae	1	1
Leguminosae	88	325
Geraniaceae	2	3
Oxalidaceae	2	8
Erythroxylaceae	1	2
Tropaeolaceae	1	5
Zygophyllaceae	1	2
Rutaceae	11	29
Simarubaceae	5	8
Burseraceae	2	8
Meliaceae	6	40
Malpighiaceae	10	30
Trigoniaceae	1	1
Vochysiaceae	1	2
Polygalaceae	3	20
Dichapetalaceae	1	2
Euphorbiaceae	28	112
Callitrichaceae	1	1
Coriariaceae	1	1
Anacardiaceae	10	16
Aquifoliaceae	1	9
Celastraceae	7	9
Hippocrateaceae	2	3
Staphyleaceae	1	2
Icacinaceae	2	2
Hippocastanaceae	1	1
Sapindaceae	15	52
Sabiaceae	1	7
Balsaminaceae	1	3
Rhamnaceae	5	10
Vitaceae	3	8
Tiliaceae	11	30
Malvaceae	16	63
Bombacaceae	7	18
Sterculiaceae	7	21
Dilleniaceae	4	6
Actinidiaceae	1	9
Ochnaceae	3	7
Caryocaraceae	1	1
Marcgraviaceae	4	14
Theaceae	15	36
Cistaceae	1	1
Bixaceae	1	1
Cochlospermaceae	1	1
Violaceae	4	15
Flacourtiaceae	14	33
Turneraceae	3	4
Passifloraceae	2	34
Caricaceae	2	4
Loasaceae	3	5
Begoniaceae	1	36
Cactaceae	8	30
Thymelaeaceae	1	1
Lythraceae	5	12
Punicaceae	1	1
Lecythidaceae	3	5
Rhizophoraceae	2	4
Combretaceae	5	8
Myrtaceae	8	39
Melastomaceae	37	213
Onagraceae	6	23
Halorrhagaceae	2	3
Araliaceae	7	22
Umbelliferae	13	25
Cornaceae	1	1
Garryaceae	1	1
Clethraceae	1	3
Monotropaceae	1	1
Pyrolaceae	1	1
Ericaceae	12	50
Myrsinaceae	6	42
Theophrastaceae	2	4
Primulaceae	1	1
Plumbaginaceae	1	2
Sapotaceae	8	19
Ebenaceae	1	2
Styracaceae	1	5
Symplocaceae	1	7
Oleaceae	4	7
Loganiaceae	5	13
Gentianaceae	12	22
Menyanthaceae	1	1
Apocynaceae	23	48
Asclepiadaceae	11	28
Convolvulaceae	12	65
Polemoniaceae	2	6
Hydrophyllaceae	2	2
Boraginaceae	8	41
Verbenaceae	16	57
Labiatae	13	59
Solanaceae	21	129
Scrophulariaceae	26	45
Bignoniaceae	30	42
Orobanchaceae	1	1
Gesneriaceae	22	99
Lentibulariaceae	1	5
Acanthaceae	36	105
Plantaginaceae	1	3
Rubiaceae	69	251
Caprifoliaceae	3	6
Valerianaceae	1	5
Dipsacaceae	1	1
Cucurbitaceae	22	54
Lobeliaceae	8	45
Compositae	101	300
Total	1,514	6,085

Of the 6,085 species of plants recorded at present from Costa Rica, 270 are listed as known only in cultivation. While most of these are of recent introduction from Europe or Asia, a substantial number are of ancient origin, and really might be considered elements of the native flora.

Only 104 species are regarded as naturalized, that is, of Old World or North American origin, but now fully established in pastures or other places. The majority of these are plants of upland pastures that probably were introduced with grass seed. In the case of some pantropic weeds, it now is impossible to determine the area of origin.

Of the total number of species, 2,299 are endemic in Costa Rica, so far as is known at present. Endemism is particularly marked in the Orchidaceae and Piperaceae, but is quite as conspicuous in many smaller groups. In these two large families, so extravagantly represented in Costa Rica, it is unlikely that the percentage of endemism will ever be greatly reduced. However, many of the Costa Rican species now supposed to be endemic will be found ultimately in the Chiriquí and Bocas del Toro regions of Panama, and in Nicaragua, the only places where similar habitats exist.

I have had time to prepare only a few other statistics. Disregarding the endemic species, there are 723 species of wider distribution having their northern limit in Costa Rica. Many are South American plants, some of them of great systematic significance. On the other hand, 574 species that range to Mexico or northern Central America have their southern limit in Costa Rica. I should have expected the latter number to have been relatively smaller, and it would be substantially reduced if there were omitted species that extend northward only into Nicaragua. Many species of the former number, it must be stated, are unknown at present south of Panama.

More significant perhaps are a few data regarding genera. There are at least 16 of these, a good many of them orchids, that are endemic in Costa Rica. There are 107 characteristically South American ones that find their northern limit in Costa Rica. There are only 26 that are preponderantly Mexican and Central American, with a southern limit in Costa Rica.

The generic data especially prove, I believe, that, as I have suggested previously, the affinities of the Costa Rican flora are rather South American than Mexican. The principal line of division between the North and South American floras lies not about the Isthmus of Panama, where geographically it might be expected, but rather in central Nicaragua, the southern limit of pine (*Pinus*) forests.

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